ELECTRICAL REVIEW

don't say 'lamps'—say Crompton

BY APPOINTMENT
TO HER MAJESTY THE QUEEN
MANUFACTURERS OF ELECTRIC LAMPS

PUBLIC LIBR
OCT 1 0 1957
DETROIT

—you'll *see* why!

CROMPTON PARKINSON LTD CROMPTON HOUSE ALDWYCH LONDON W.C.2 TELEPHONE CHANCERY 1111

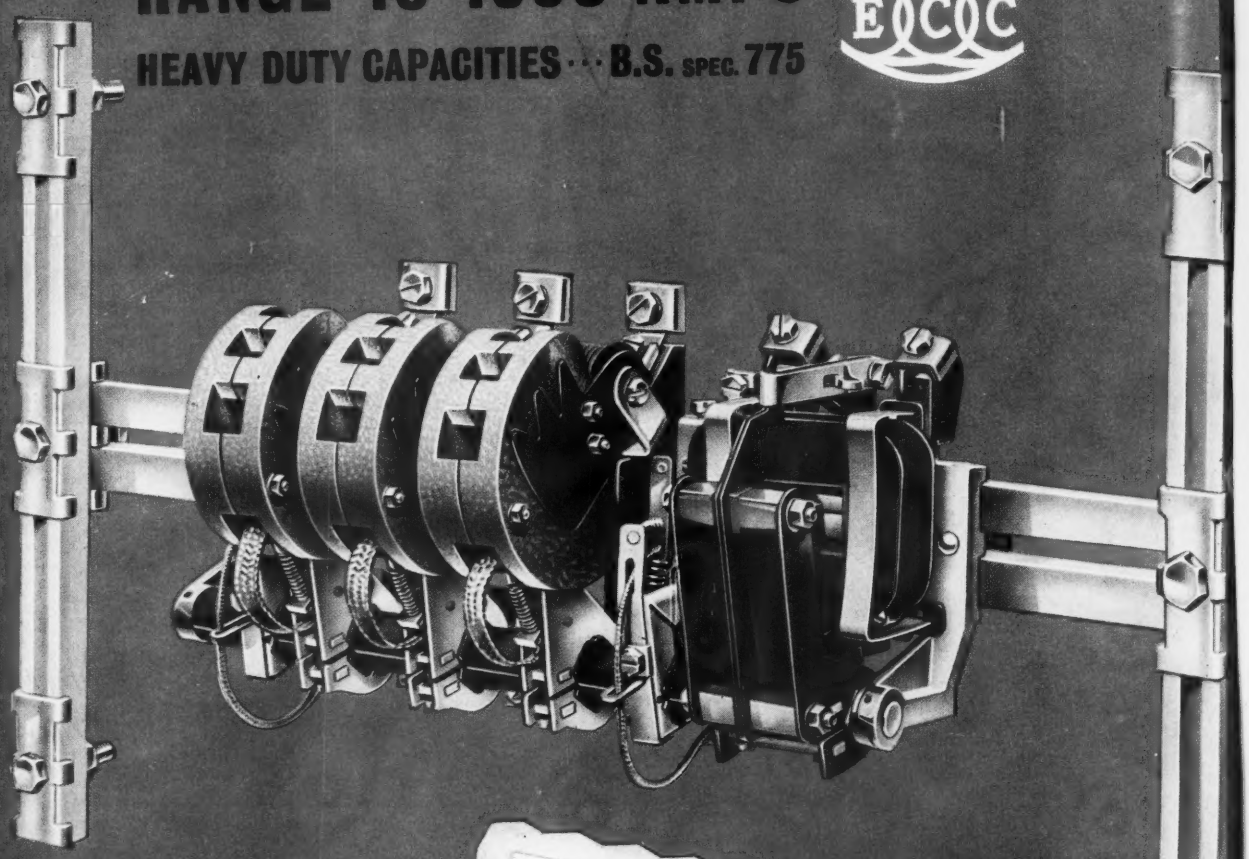
"as supplied to the ATOMIC ENERGY AUTHORITY"

CONTACTORS by

RANGE 10-1000 AMPS

ECC

HEAVY DUTY CAPACITIES · · · B.S. SPEC. 775



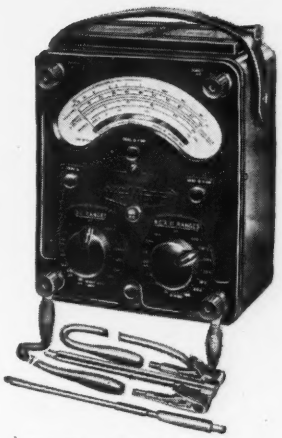
To customers demands

THE ELECTRIC CONSTRUCTION COMPANY LTD
BUSHBURY ENGINEERING WORKS
WOLVERHAMPTON

BROCHURE S.830
GIVES FULL DETAILS
(available on request)

The Model 8 is a high-sensitivity version of the Universal AvoMeter, having **a sensitivity of 20,000 ohms per volt on all D.C. ranges, and 1,000 ohms per volt on A.C. ranges from 100V. upwards.** Accuracy on D.C. current ranges and A.C. ranges is to B.S. Spec. 89/1954 and on D.C. voltage ranges within 2% of indication from full scale to half scale deflection and 1% of full scale value below half scale deflection.

In addition to the many well-known AvoMeter features, such as the automatic overload protection device, dual-knob range selection, etc., it has a push-button for reversing the polarity of the movement to obviate the inconvenience of changing over the leads when encountering opposite potentials in respect to a common reference point.



Size: 8⅛in. × 7¼in. × 4½in.
Weight: 6½lb. (including leads).

VOLTAGE AC/DC: 25mV. to 2,500V.

CURRENT AC/DC: 0.5 microamps to 10 amps.

RESISTANCE
0-20 megohms with internal batteries.
0-200 megohms with external D.C. supply.

DECIBELS: — 15 Db to + 15 Db.

List Price
£23 . 10s.

Fully descriptive pamphlet available on application

Sole Proprietors and Manufacturers:—

AVO LTD.

Formerly THE AUTOMATIC COIL WINDER & ELECTRICAL EQUIPMENT CO., LTD.

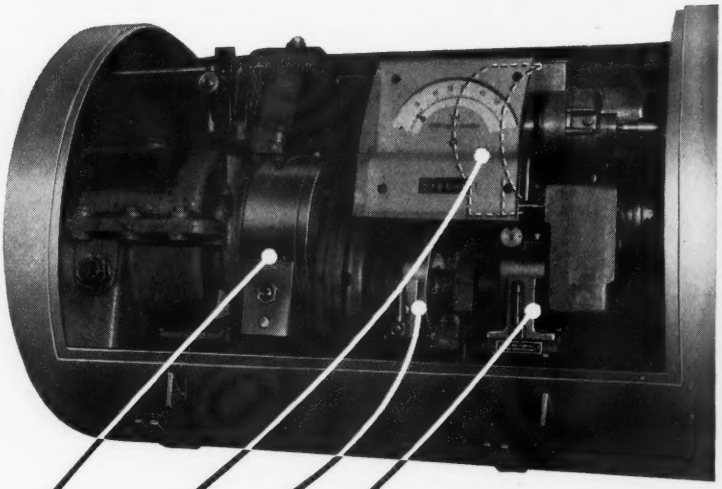
AVOCET HOUSE · 92-96 VAUXHALL BRIDGE ROAD · LONDON · S.W.1 *Telephone : VICtoria 3404 (9 lines)*

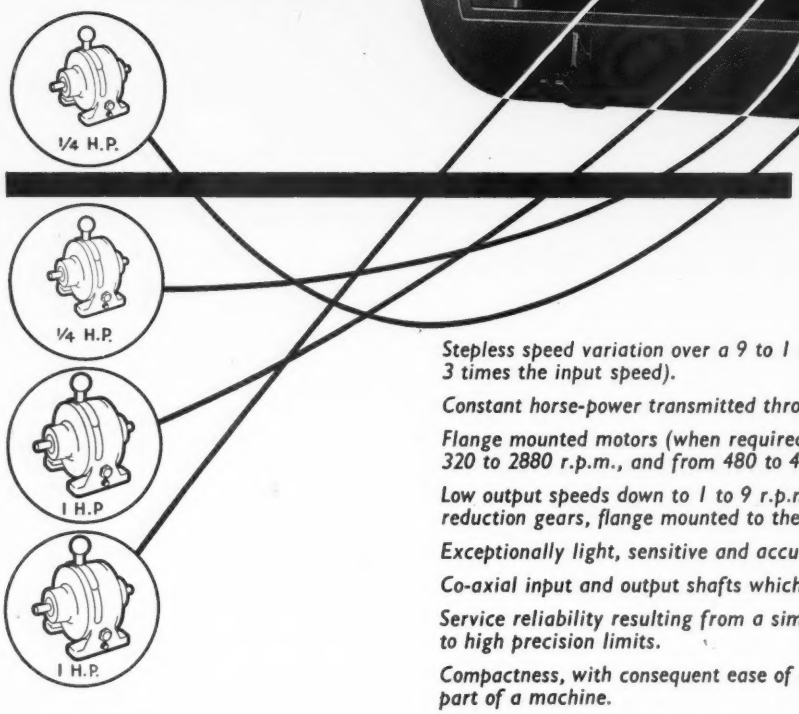
G.11/A8

A

One of many applications for the Kopp GEARLESS GEARBOX

4 VARIATORS
are incorporated on this Pendan Feeder manufactured in quantity by F.L. Smidth & Co. of Copenhagen





Stepless speed variation over a 9 to 1 output speed range (1/3 to 3 times the input speed).

Constant horse-power transmitted throughout the speed range.

Flange mounted motors (when required) giving output speeds from 320 to 2880 r.p.m., and from 480 to 4320 r.p.m.

Low output speeds down to 1 to 9 r.p.m., or lower, obtained with reduction gears, flange mounted to the Variator.

Exceptionally light, sensitive and accurate control of speed setting.

Co-axial input and output shafts which rotate in the same direction.

Service reliability resulting from a simple design manufactured to high precision limits.

Compactness, with consequent ease of mounting as an integral part of a machine.

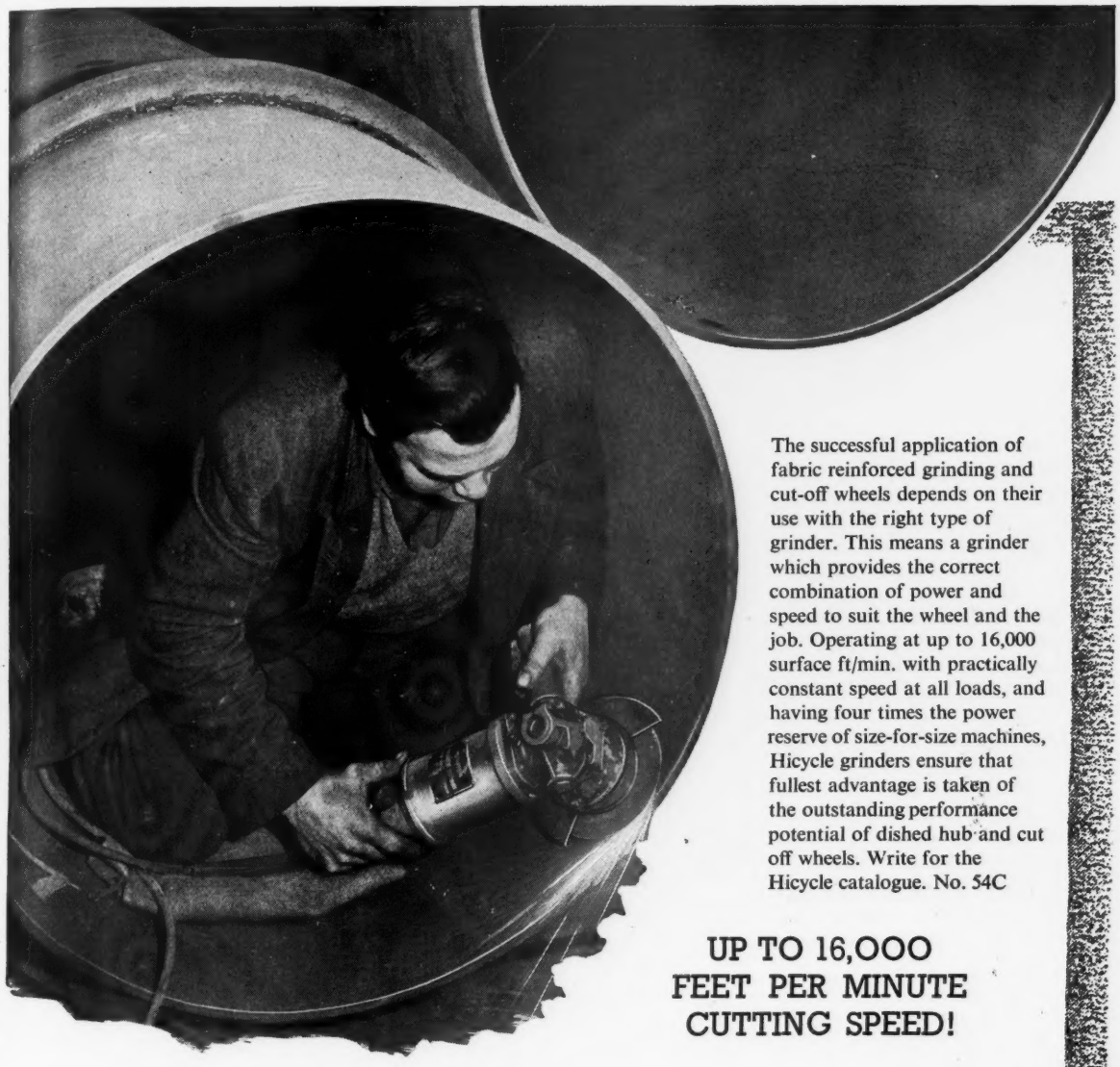
Vibrationless and silent performance.

Standard range 1/33 h.p. to 15 h.p.

Kopp **VARIABLE SPEED GEAR**

Allspeeds Limited,
Oakenshore Works, Clayton-le-Moors, Accrington, Lancs Telephone: Accrington 5441 (4 lines)

REGIONAL OFFICES
LONDON: *59 Park Road North, Acton, W.3. Tel: Acorn 7150*
SCOTLAND: *P.O. BOX No. 1, Clarkston, Glasgow Tel: Busby 2738*
MIDLANDS: *Much Park Street, Coventry. Tel: Coventry 63091*
YORKSHIRE: *46 Park Square, Leeds, 1 Tel: 3-1146, 3-0285/6*



The successful application of fabric reinforced grinding and cut-off wheels depends on their use with the right type of grinder. This means a grinder which provides the correct combination of power and speed to suit the wheel and the job. Operating at up to 16,000 surface ft/min. with practically constant speed at all loads, and having four times the power reserve of size-for-size machines, Hicycle grinders ensure that fullest advantage is taken of the outstanding performance potential of dished hub and cut off wheels. Write for the Hicycle catalogue. No. 54C

UP TO 16,000 FEET PER MINUTE CUTTING SPEED!

WHAT IS HICYCLE? A range of electric tools for increasing the output per man by stepping up the electricity supply to 200 cycles, thus providing a high, maintained working speed. Other advantages are: greater reliability because there are no armature windings to burn out, greater power with no increase in weight, and absolute safety because of only 72 volts to earth. If you use six or more portable electric tools, you can definitely increase production and reduce maintenance by installing Hicycle.

Hicycle

ELECTRIC PRODUCTION TOOLS

MADE BY

Consolidated Pneumatic

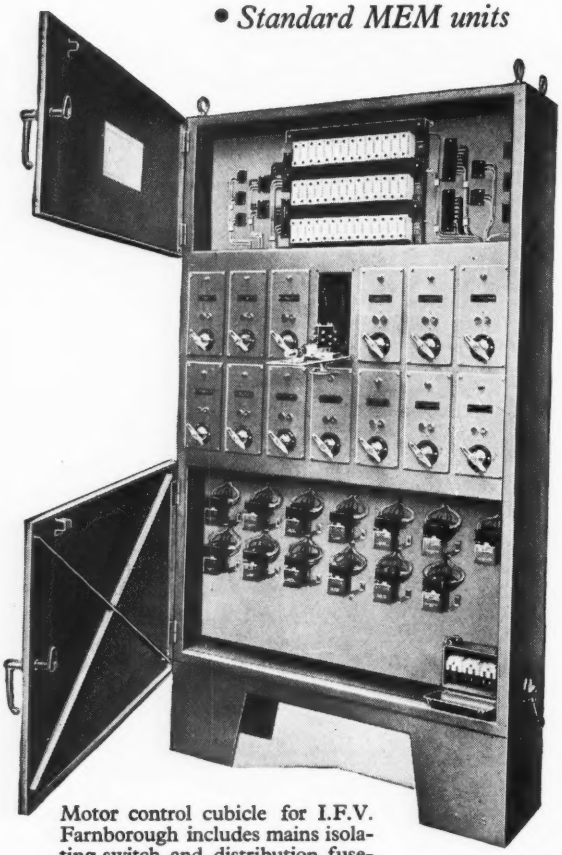
CONSOLIDATED PNEUMATIC TOOL CO. LTD., 232 DAWES ROAD, LONDON, S.W.6.

AIR COMPRESSORS • PNEUMATIC TOOLS • ELECTRIC TOOLS • CONTRACTORS EQUIPMENT • ROCK DRILLS • PUMPS • DIAMOND DRILLS

CP118

Let MEM quote for the panel too

• *Standard MEM units* • *Compact design* • *Easy maintenance*

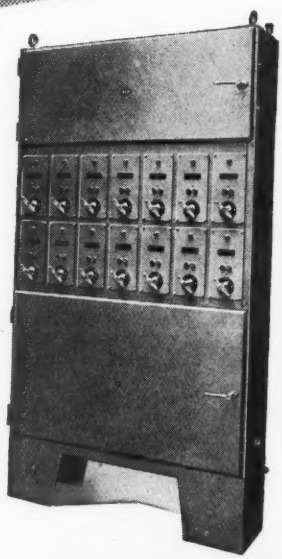


Motor control cubicle for I.F.V. Farnborough includes mains isolating switch and distribution fuseboard feeding thirteen starters via rotary switches.

DO YOU KNOW that MEM have a large department which specialises in L.T. switchboards? Many of Britain's leading industrial concerns and institutions come regularly to MEM for their switchboards. The reasons are simple. MEM switchboards for the most part include standard MEM Switchgear, Fuseboards, Bus-Bar Chambers and Motor Control Gear. These are proved all over the world, simple, robust and easy to maintain.

You also get excellent engineering service from MEM whose staff of experts is always ready to help in designing your panels.

When your next switchboard comes up, be sure to ask MEM to quote.



Closed view of motor control cubicle for I.F.V. Farnborough.

Installed by Ministry of Works on behalf of Ministry of Supply.

MEM

Switch, fuse and motor control gear, electric fires and localised lighting equipment

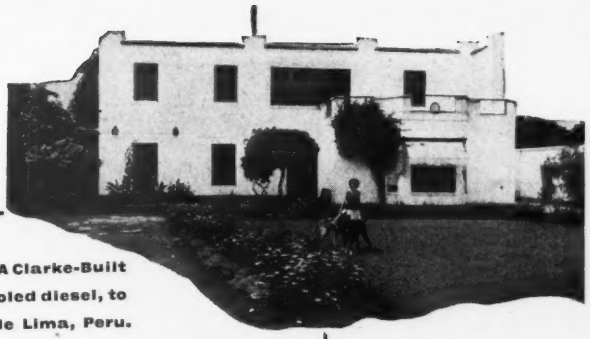
MIDLAND ELECTRIC MANUFACTURING CO. LTD.,

SWITCHBOARD DIVISION

TYSELEY, BIRMINGHAM 11.

BRANCHES IN LONDON AND MANCHESTER.

. . . on a farm in Peru



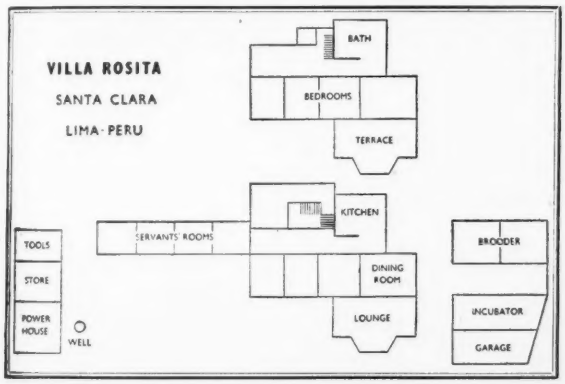
Three years ago, Mr. H. Kent Atkinson purchased an 8-KVA Clarke-Built generating set with Armstrong Siddeley 2-cylinder air-cooled diesel, to operate lighting and plant on his chicken farm outside Lima, Peru. These are extracts from a recent letter from Mr. Atkinson:

Instant starting

"The set is equipped with electric starting from a 12-volt car-type battery, with two remote-control stations in the house which is situated about 40 direct yards from the "power house". Any time that power is required in the house, my wife or servants have only to push the button in the kitchen downstairs or in the master bedroom upstairs, and the plant starts up automatically."

10,000 hours without replacing a part

"The plant has now run over 10,000 hours in the three years' service and has not had one single part replaced through wear. It is never necessary to add oil to the crankcase between drain-and-refill periods."



Seven months continuous running

"For one period of incubating and chick-rearing, the plant was running continuously for seven months. On this continuous service it was found necessary only to change the oil, etc. every 400 hours. This regular maintenance job takes one hour's attention per month and is practically all the attention the plant calls for.

"The cylinder heads have been removed only twice in the three years for the cleaning of carbon from the heads and piston crowns and for grinding-in the valves—these "decokes" were not done because of signs of distress from the engine. The job took six hours in each case with no outside assistance.

"The electric household and workshop appliances have multiplied enormously since the installation of this set and now include the following (in addition to some 40 lights):—

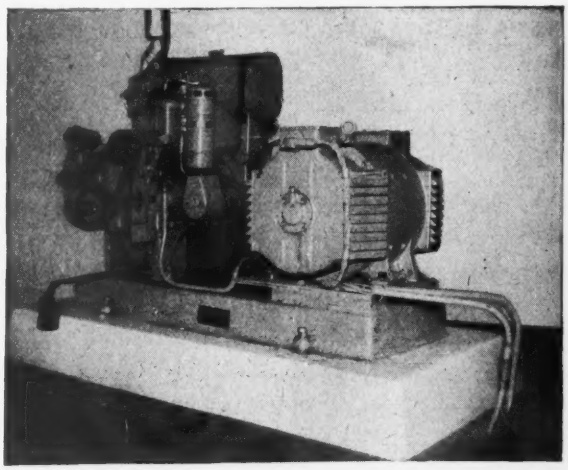
2 WATER HEATERS • WASHING MACHINE • 2 ELECTRIC IRONS
WAFFLE IRON • GRAMOPHONE PICK-UP • 2 FANS
DEEP WELL WATER PUMP • FUEL PUMP FROM BULK SUPPLY TANK
ELECTRIC MIXER • ELECTRIC BROILER • VACUUM CLEANER
FLOOR POLISHER • 3 ELECTRIC FIRES • MOVIE PROJECTOR
RADIO • TAPE RECORDER • ELECTRIC RAZOR • SOLDERING IRON
INCUBATOR • INFRA-RED CHICK REARERS • CHAFF-CUTTER
ELECTRIC WELDER • GRINDING & BUFFING WHEELS • CIRCULAR SAW
PAINT SPRAYER • FLEXIBLE SHAFT TOOL-HOLDER

"Whilst it is true that all these appliances can never be in use at the same time, the engine always has plenty of power and has never shown signs of over-heating.

"I have no hesitation in recommending the air-cooled Armstrong Siddeley unit to anyone who is away from municipal power supplies."

This record of reliability can be repeated in every one of the scores of industries in which Armstrong Siddeley Air-Cooled Diesels provide power.

THREE MODELS FROM 6 TO 33 H.P. SEND NOW FOR LEAFLETS



The generating set in situ at the Lima farm

ARMSTRONG SIDDELEY (BROCKWORTH) LTD

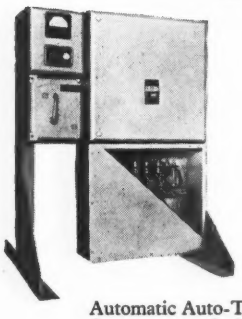
HUCCLECOTE • GLOUCESTER

TELEPHONE: GLOUCESTER 21531 • TELEGRAMS: BROCKARM, GLOUCESTER

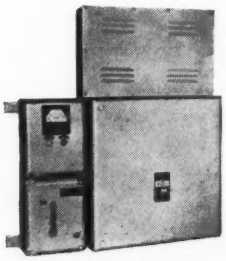
NEW

BKS

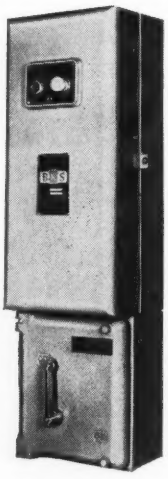
RANGE OF AUTOMATIC MOTOR STARTERS



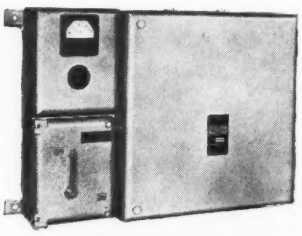
Automatic Auto-Transformer Starters. Suitable for controlling motors up to 40 h.p. **LIST AT 60**



Automatic Stator Rotor Starters. Suitable for controlling slip ring motors up to 40 h.p. **LIST SR 60**



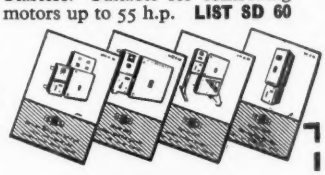
Heavy Duty Direct-On-Line Starters. Suitable for controlling motors up to 30 h.p. **LIST DO 60**



Heavy Duty Automatic Star-Delta Starters. Suitable for controlling motors up to 55 h.p. **LIST SD 60**

Searching out new knowledge, translating it into products people can use, and then making these products widely available, is the role of our technical engineers. The new range of automatic motor starters announced in this advertisement embody modern design and advanced construction features for economy in installation and service. Application for literature will be dealt with by return of post.

Send for these leaflets



BKS

BRITISH KLOCKNER SWITCHGEAR LTD.

Head Office and Works : **CHERTSEY, SURREY**

Telephone : Chertsey 2067. Telegrams : Switchgear, Chertsey

SALES OFFICES :

MANCHESTER 4 : Cromford House, Cromford Court. Tel : Blackfriars 3903

GLASGOW : 249 St. Vincent Street. Tel : Central 2479

NEWCASTLE : 4 Beechwood Avenue, Monkseaton, Whitley Bay, Northumberland. Tel : Whitley Bay 24231

BIRMINGHAM : 190 Aldridge Road, Streetly, Staffordshire. Tel : Streetly 78941

TO

BRITISH KLOCKNER SWITCHGEAR LTD. CHERTSEY, SURREY. Please send me a copy of List **AT 60,** List **SR 60,** List **DO 60,** List **SD 60**

Indicate by tick which List/s required

NAME .....

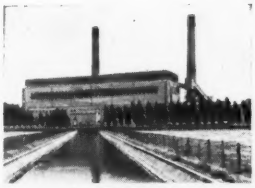
POSITION .....

FIRM .....

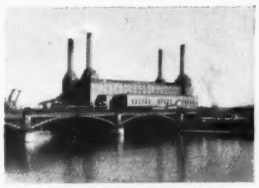
ADDRESS .....

E.R.

STURTEVANT ELECTROSTATIC PRECIPITATORS

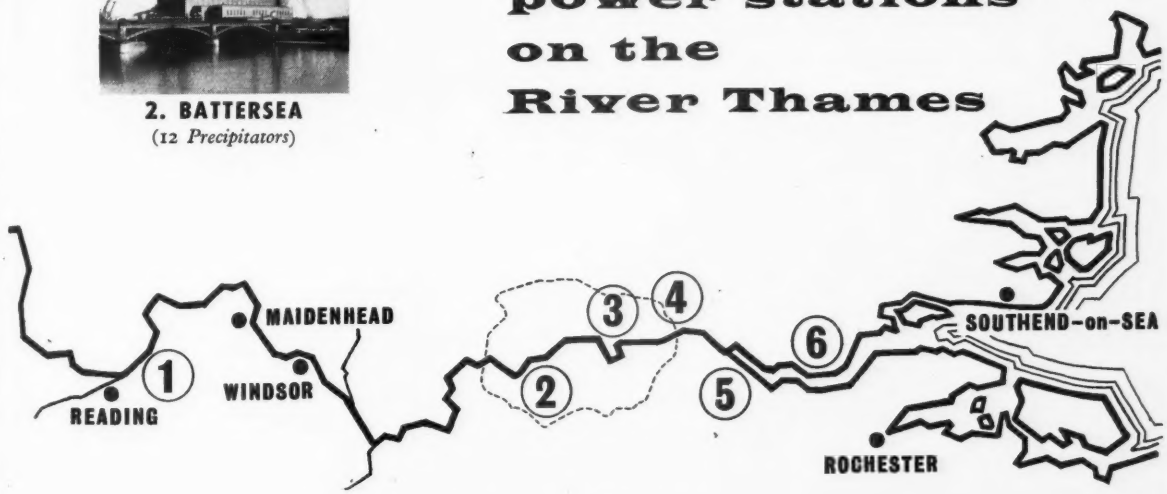


1. EARLEY
(7 *Precipitators*)

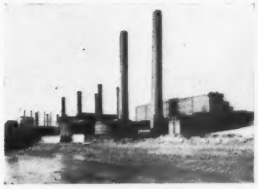


2. BATTERSEA
(12 *Precipitators*)

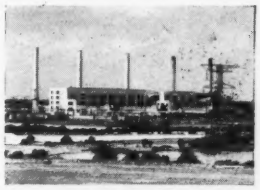
... in power stations on the River Thames



3. BRUNSWICK WHARF
(11 *Precipitators*)



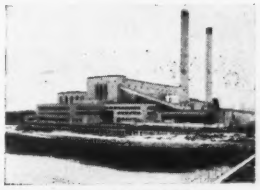
4. BARKING
(6 *Precipitators*)



5. LITTLEBROOK
(14 *Precipitators*)

Sturtevant make dry or irrigated precipitators of all types—tubular, plate, single or dual-voltage with pre-ionisers—and Sturtevant Engineers are ready to collaborate in the application of this range of plant.

General technical particulars are given in our publication U7009 which is obtainable upon request.



6. TILBURY
(6 *Precipitators*)

STURTEVANT ENGINEERING CO. LTD.

Southern House Cannon Street London E.C.4

AUSTRALIA: STURTEVANT ENGINEERING CO. (AUSTRALASIA) LTD. 400 SUSSEX STREET SYDNEY N.S.W.

Castle LEATHEROID

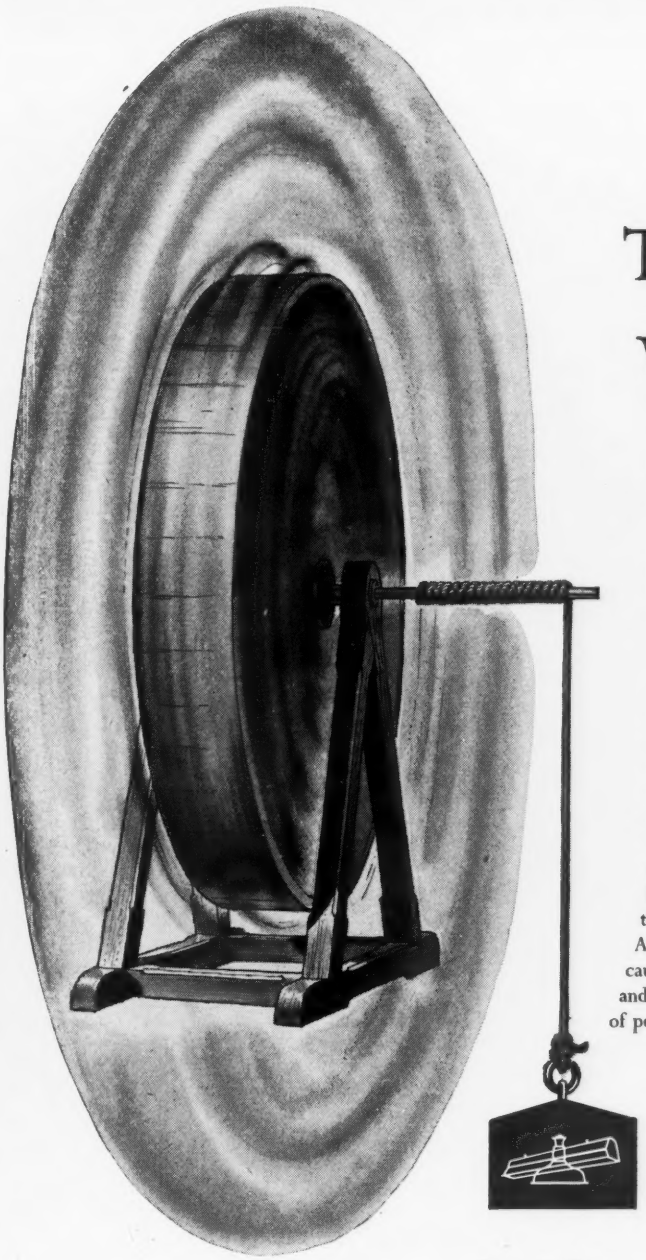
. . . THE FINEST
INSULATION MATERIAL
FOR THE ELECTRICAL INDUSTRY

LONDON OFFICE:
8, KING WILLIAM STREET
E.C.4.
PHONE: MANSION HOUSE 0452

Vulcanised Fibre Ltd
GUILDFORD & EYNSFORD

MANCHESTER OFFICE:
ROYAL BUILDINGS
2, MOSLEY STREET
PHONE: CENTRAL 5947

MAKERS OF FINE MATERIALS



The Wheel Of Orffyreus

In the 18th century
Johann Ernest Elias Bessier—
known as Orffyreus—invented a wheel that,
once started, went on and on . . . and on.
Between 1712 and 1717 Orffyreus made four
such wheels, the last subjected to rigid
examination by scientists and experts,
then placed in an empty, sealed room
for two months. On re-entry
the wheel was found, still spinning.
A fit of rage over continuing scepticism
caused Orffyreus to smash his invention
and he died in 1745, taking his secret
of perpetual motion with him.

In a similar manner Benjamin lighting fittings
last indefinitely. The 'Crysteel' vitreous enamel
finish will not deteriorate but will give
ideal economic lighting year after year.
Write today for full details
of the Benjamin range of lighting fittings.

BETTER LIGHTING BY BENJAMIN REGD.

THE BENJAMIN ELECTRIC LIMITED · TOTTENHAM · LONDON N.17
Telephone: TOTtenham 5252 (5 lines) · Telegrams: 'Benjalect, Southtot, London'
BIRMINGHAM: 5 Corporation Street, Birmingham 2. Tel: MIDland 5197 · **LEEDS:** 49 Basinghall Street, Leeds 1. Tel: LEEDS 25579

Smees 109

Measurement

single disc polyphase meter

1. In its neat bakelite insulated case the most compact meter on the market.

2. Half the size and weight of three disc type.

3. High torque weight ratio.

4. Negligible interaction.

5. Torque balance and all other adjustments readily accessible.

6. Anisotropic brake magnets giving maximum stability.

7. Outsize performance that makes it just right for your requirements.

Measurement Ltd

(A Member of the Parkinson & Cowan Group)

Tameside Works, Dobcross, Nr. Oldham.
Tel. Nos. Delph 284 & 291/2.

Export enquiries to Parkinson & Cowan Group Exports Ltd., Terminal House, Grosvenor Gardens, London, S.W.1.
Tel. Nos. SLOane 0111/4. Cables: DISC, London.

Here's *where* and *why* you'll find Du Pont neoprene-jacketed cable in use today

	Sunlight and weather resistance	Oil resistance	Grease resistance	Abrasion resistance	Ozone resistance	Flexibility	Heat resistance	Chemical resistance	Flame resistance	Fungus resistance	Ease of installation	Dimensional stability
Underground—buried or in ducts						✓			✓		✓	✓	✓
Suspended outdoors	✓				✓	✓			✓		✓	✓	✓
In tropical climates	✓					✓		✓			✓		
On trucks, automobiles, railroads	✓	✓	✓	✓	✓	✓	✓	✓	✓				✓
On ships and airplanes	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
In underground coal mines				✓	✓	✓		✓	✓	✓			
In chemical plants					✓		✓	✓					
In oil refineries		✓	✓		✓		✓	✓					
In power plants	✓				✓						✓		
In steel mills, plating plants			✓	✓	✓		✓	✓	✓				✓
On outdoor cranes, shovels, welding and construction equipment	✓	✓	✓	✓	✓	✓				✓			✓
On indoor hoists, elevators		✓	✓	✓	✓	✓							
On portable tools in machine shops, garages		✓	✓	✓	✓	✓							
On kitchen appliances		✓	✓	✓	✓	✓	✓	✓	✓				✓

IF YOU WANT A CABLE THAT WILL GIVE LONGER SERVICE— INSIST ON DU PONT **NEOPRENE-JACKETED** CABLE

FREE! The Neoprene Notebook. Each issue is filled with interesting case histories about Du Pont neoprene . . . tells how it improved old products, how it helped develop new ones. Clip coupon to get on the mailing list.

Neoprene/Hypalon products are made in this country. For details of suppliers or any other information required please write to the sole distributors in the U.K.: Durham Raw Materials Ltd., 1/4 Great Tower Street, London, E.C.3.

NEOPRENE

The rubber made by Du Pont since 1932

DU PONT

REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

E. I. du Pont de Nemours & Co. (Inc.)
Rubbur Chemicals Department, Export
Division, ER22 Wilmington 98, Delaware, U.S.A.

Please put me on the mailing list for the Neoprene Notebook.

Name ..... Position .....

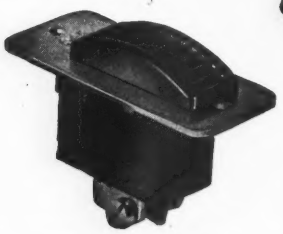
Firm .....

Address .....

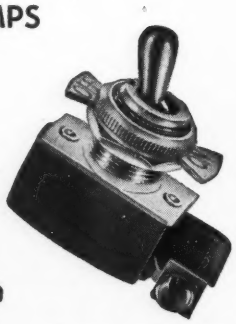
UK Distributors, Durham Raw Materials Ltd., 1-4 Great Tower St. London EC3

ARCOLECTRIC
SWITCHES & SIGNAL LAMPS

- For Industrial Equipment
- Domestic Appliances
- Electronic Instruments
- Automobile Switching

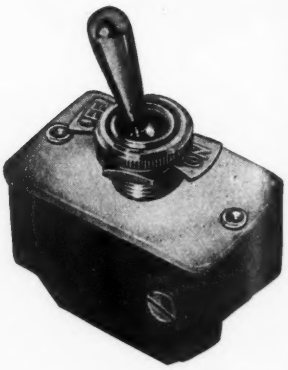


SLIDE THUMB SWITCH—S.645
3 amp., 250 volt

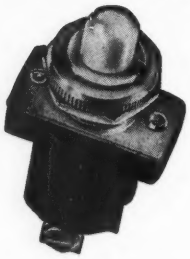


MINIATURE TOGGLE SWITCH—H.600
3 amp., 250 volt

MAINS VOLTAGE SIGNAL LAMP—S.L.81
Complete with built-in neon tube and resistance. Models from 80 to 500 volts. Fixing: Single ¼" hole.



10 AMP. TOGGLE SWITCH—M.30
For electric fires



DOOR OPERATED SWITCH—S.930
For refrigerators

SMALL POINTER KNOB—K.75
For ¼" spindles

Write for latest Catalogue No. 131

ARCOLECTRIC
SWITCHES · LTD

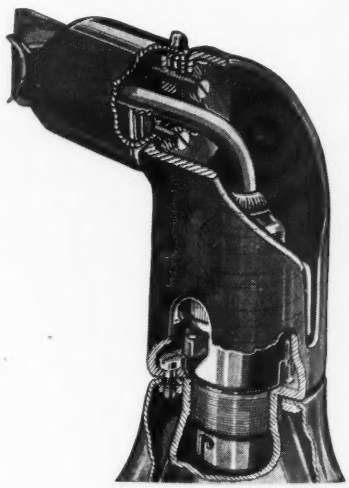
CENTRAL AVENUE, WEST MOLESEY, SURREY · PHONE: MOLESEY 4336

When there is a better switch Arcolectric will make it

MEKELITE

GEARED JOINT

INDUSTRIAL LIGHTING UNITS



Catalogue sent free on request

The Swivelling Head carries the reflector and protects the lampholder from accidental damage, openings being provided for access to the push-bar. "Sudsproof" and "Edison Screw" types are also available. Six sizes of reflector.

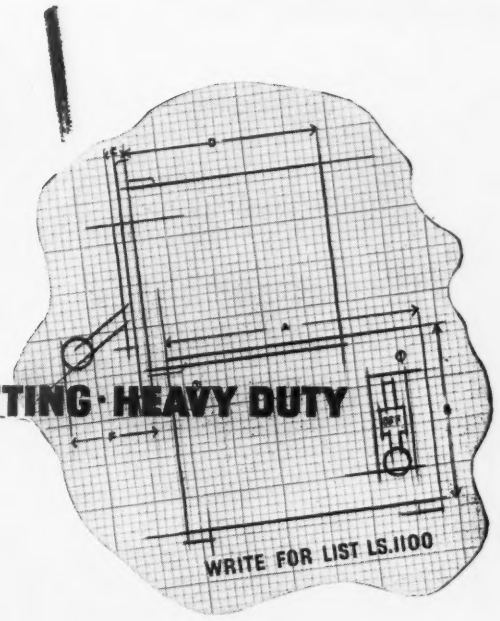
Various lengths of arm (maximum horizontal reach 54 in.). With pillar or short vertical pivot. Bases for wall, bench, ceiling, floor or for mounting direct on machines. Also portable types.

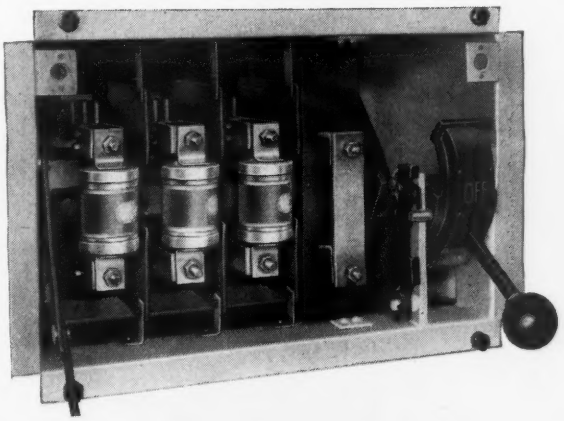
MEK-ELEK Engineering Ltd., 17 Western Road, Mitcham, Surrey
Phone: MITcham 3072 Cables: Mekelek, London

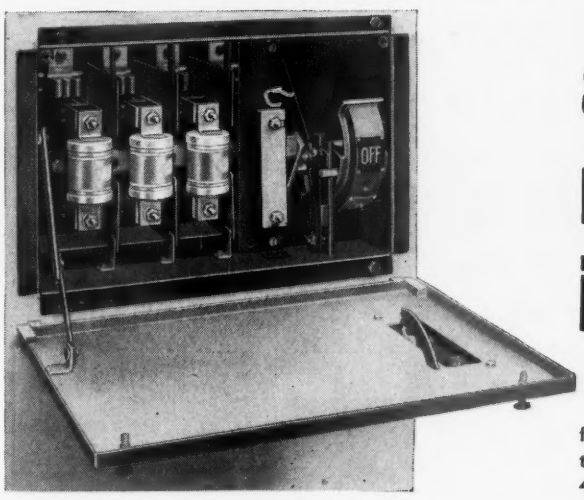
For Control Apparatus, Cubicles or Customer's own Requirements

UNI-FRONT SWITCHES

FLUSH FITTING · HEAVY DUTY







Where appearance counts... and reliability is essential

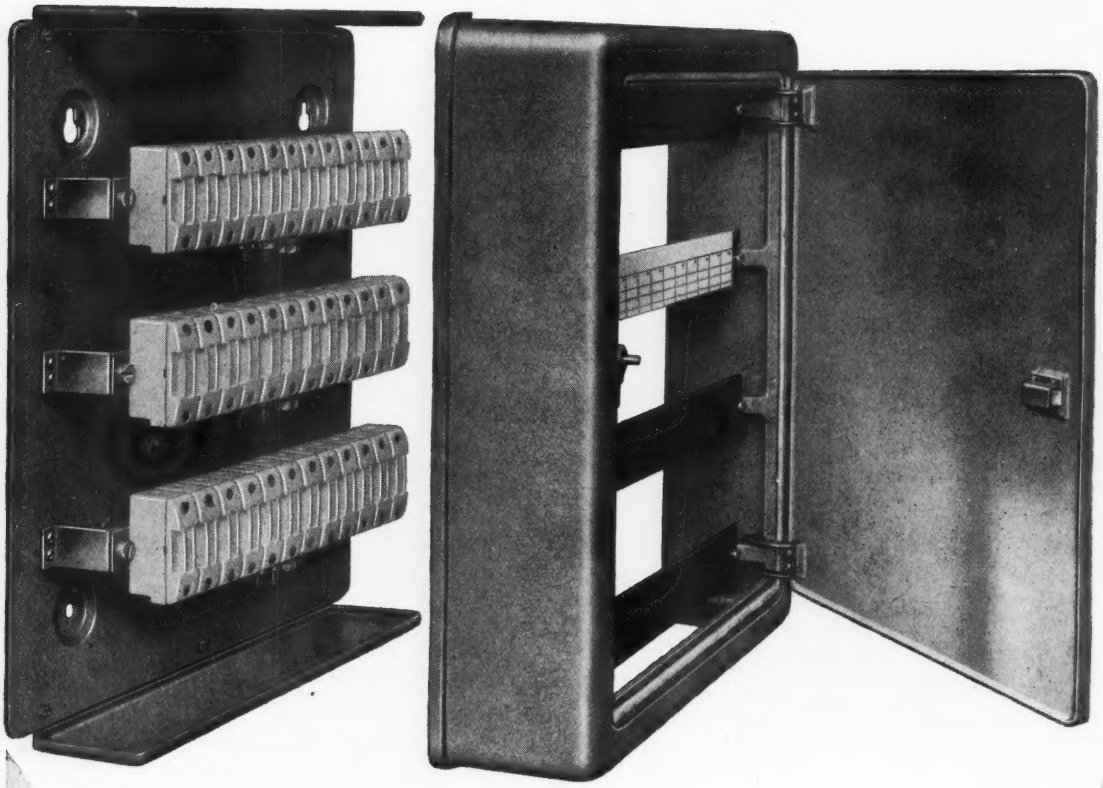
Flush fitting Heavy Duty 'UNI-FRONT' fused switches with protected contacts up to 660 volts A.C. and 250 volts D.C. 45 to 400 amps.

LANCASHIRE DYNAMO NEVELIN LTD

(SWITCHGEAR DIVISION)

HURST GREEN, OXTED, SURREY • TELEPHONE: OXTED 3361 • TELEGRAMS: NEVELIN, OXTED

SI



the ***NEW***

"SANDALINE"

SURFACE MOUNTING FUSEBOARDS

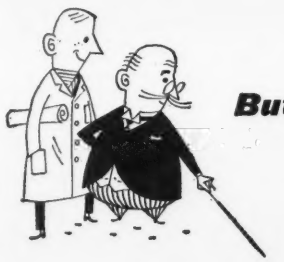
★ **EASY INSTALLATION**

★ **INTERCHANGEABLE H.R.C. OR REWIREABLE FUSES**

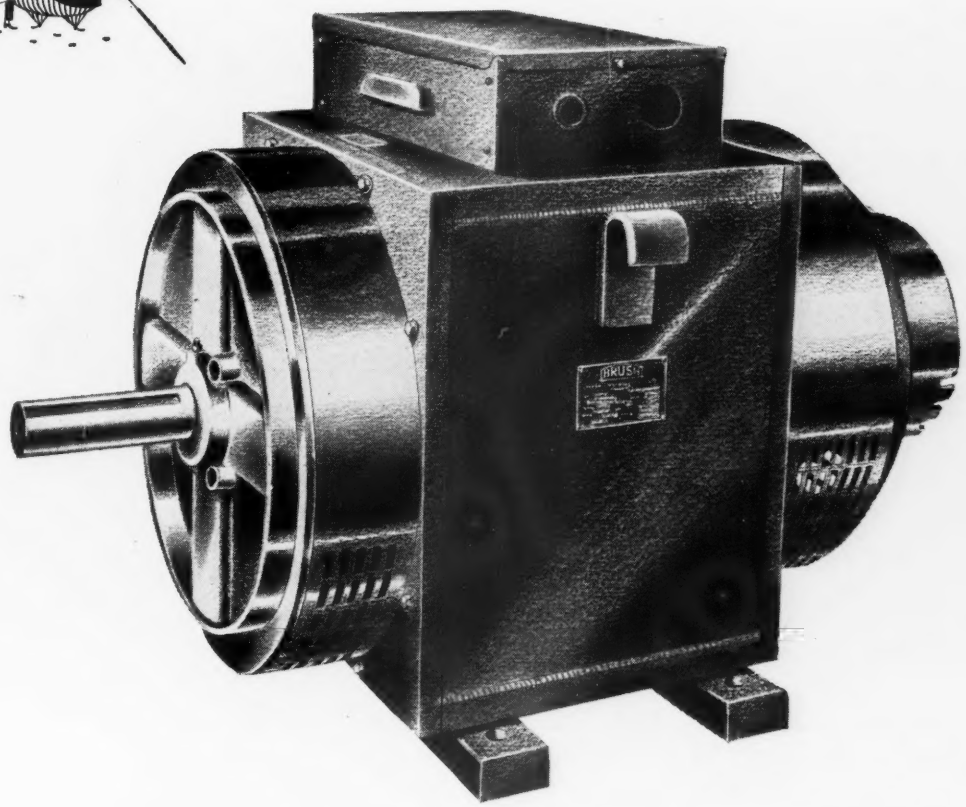
Send for leaflet 156/57

WM. SANDERS & CO. (WEDNESBURY) LTD.
WEDNESBURY · STAFFS

SANDERS
WEDNESBURY



But why choose Brush Square Path Alternators?



Because, sir, by using novel design methods Brush have made their Square Path Alternators absolutely unbeatable. They're space-saving. Easily serviced. Highly efficient. And at a price that is really competitive.

Then, just look at their performance. Take the self-regulated, self-excited type. On lighting loads, for instance, the voltage regulation can be held within plus or minus two-and-a-half per cent, irrespective of normal variations of engine speed or temperature.

Hmm. But, don't forget, our self-contained generating sets are exported all over the world. Will these alternators be as reliable in the tropics or the tundra as they are here?

Absolutely, sir. They are built to operate in any kind of climate. You can rely on that.

And what's the delivery position?

As quick as you like, sir. Within weeks.

Well then—what are we waiting for? Order from Brush.

BRUSH

Two types available: Self-regulated and self-excited with outputs of 1 to 40kVA. Self-excited but externally regulated with outputs of 1 to 62½kVA. 12 or 24 volt D.C. system included. Engine-starting and battery-charging windings can be provided.

Square Path Alternators

For full details, write for Publication No. C1502/AD

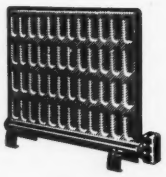
BRUSH ELECTRICAL ENGINEERING CO LTD · LOUGHBOROUGH · ENGLAND *Member of the Brush Group* A2

the big, new, exciting range of electric heaters from dimplex

Which really cater for every home, every purse and pocket!

FOR LONG TERM HEATING

The famous 'Dimplex' permanently oil-filled thermostatically controlled electric radiators. Big range of models, ½ — 2 kw. Eight colours.
Write, too, for details of the new Dimplex Junior Model.



FOR SHORT TERM HEATING

Domestic Infra-red Heaters incorporating new features.

FOR SHORT AND LONG TERM HEATING

Convector Heaters — Skirting Board Styled — two sizes which can be built up in multiples.

FOR THE HOUSEWIFE

Airing Cupboard Heaters — permanently oil-filled — safe, scorch free and economical in use.

FOR EVERY BATHROOM

Electric Towel Rails — permanently oil-filled — four models available.

AND FOR INDUSTRY

Infra-red Heaters — 2½ kw and 4 kw. Flameproof Electric Radiators — fully Buxton certified.

This advertisement will appear in 70 million copies of monthly magazines between September and Christmas and in scores of newspapers all round the country. Yes indeed, big backing for YOU, plus new literature, new showcards. Write for a supply today.

DIMPLEX LTD
MILLBROOK
SOUTHAMPTON
Tel. 74425 - 9

WEATHERPROOF METAL-CLAD SOCKETS, PLUGS, SWITCH SOCKETS etc.

for all electrical purposes

REGD. TRADE MARK **NIPHAN** 5-300 amp. 250-500 Volt

Plug
C.I. Switch Socket and Cover
Flange Socket with Cover and Plug
Through Angle Flange Socket with Cover and Plug
C.I. Terminal Socket and Cover with through sealing chamber and glands for cable

SIMMONDS & STOKES (NIPHAN) LTD
MANUFACTURING ELECTRICAL ENGINEERS
Victoria House, Southampton Row, London, W.C.1. HOLborn 2163, 8637

The APPELBE "BULB FIXER"

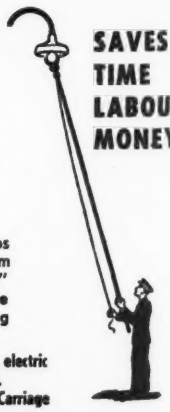
NO LADDERS REQUIRED

Telescopic appliance for fixing and removing electric bulbs. Any reasonable height can be reached.
Made of Aluminium and can be carried with ease on any cycle.

STANDARD MODEL
for 60 to 200 watt lamps at 16' 6" from ground. 6' 0" closed. 12' 0" extended. Weight 3 lb. Cycle clips and Extension Tubing supplied.

"A" MODEL
for 200 to 500 watt lamps E.S. Caps at 20' 0" from ground. 7' 0" closed. 16' 6" extended. Weight 5½ lb. Cycle clips and Extension Tubing supplied.

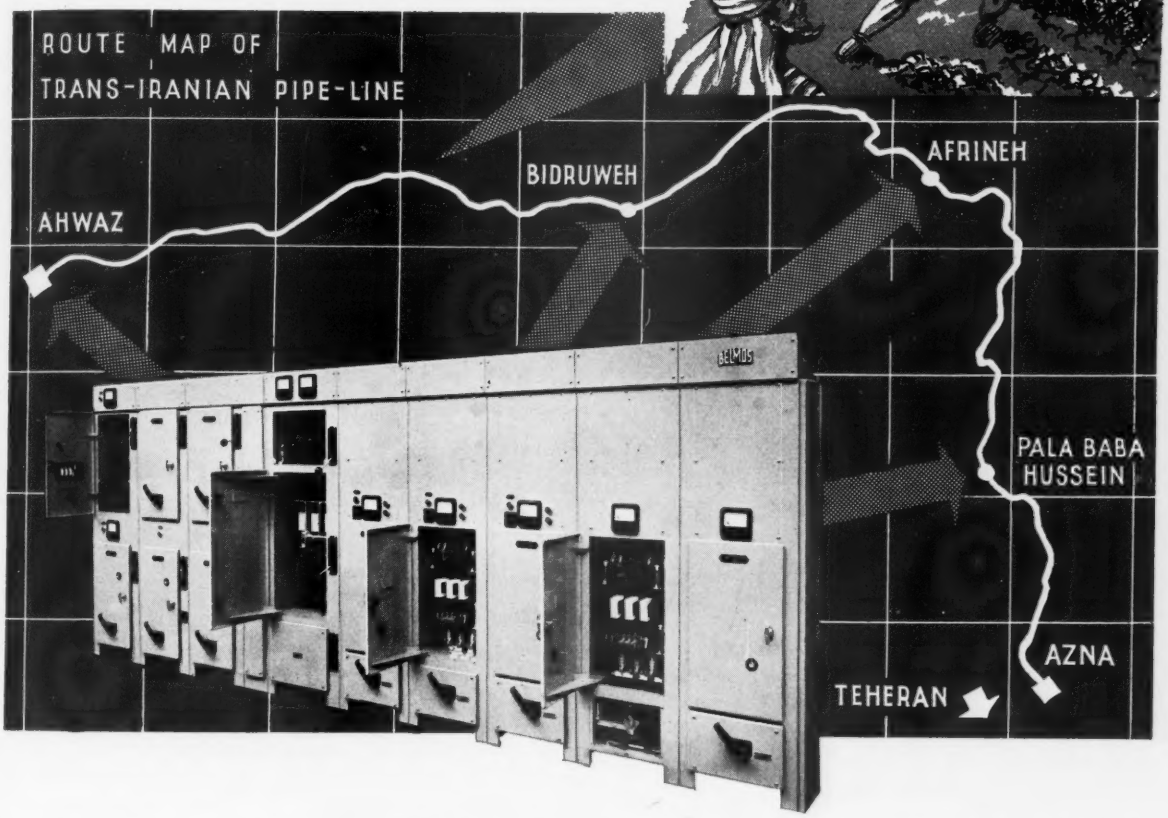
SAVES TIME LABOUR MONEY



Used by the leading corporation and electric light companies throughout the world.
Prices and particulars on request. Carriage Paid in Great Britain.

J. F. APPELBE & CO. LTD.
GREAT UNION STREET, HULL
Telephone 33522, 31212 and 8725. Telegraphic Address: "Appelbeco, Hull"

BELMOS SERVES THE OIL INDUSTRY ABROAD



Running for 300 miles, the Trans-Iranian oil pipeline connects the town of Ahwaz (a focal point of the existing crude oil pipeline system of sixty miles north of Abadan), to the town of Asna, forming the southern part of a project which, in all, will stretch from Abadan to Teheran ; the line from Abadan to Ahwaz being already in existence, while the Northern section from Asna to Teheran is being laid by a French firm. The completed pipeline will cover some 580 miles and will convey Gas Oil, Kerosene and Motor Spirit.

There are four pumping stations between Ahwaz and Asna, each station being similar in engine capacity (1,500 h.p.). The main control gear for the electrically operated pumps and compressors at each station comprises a Belmos Group Control Board of the industrial type with appropriate remote control stations—the latter including flameproof units at hazardous locations.

Much of the pipeline crosses difficult mountainous terrain, reaching a height of nearly 7,000 feet above sea level. The present stage has a capacity of 1,000,000 tons a year and provision has been made for doubling this, together with extra pumping stations.

The Control Board shown is typical of the four supplied, and comprises an incoming air-break circuit breaker, five stator/rotor starters for slip ring motors, and four direct-on line starters for squirrel cage motors, with an additional feeder circuit at AHWAZ only.

Acknowledgements :

We are indebted to Messrs. Costain-John Brown Ltd., who designed and constructed the pipeline project as main contractors, for permission to use the information given.

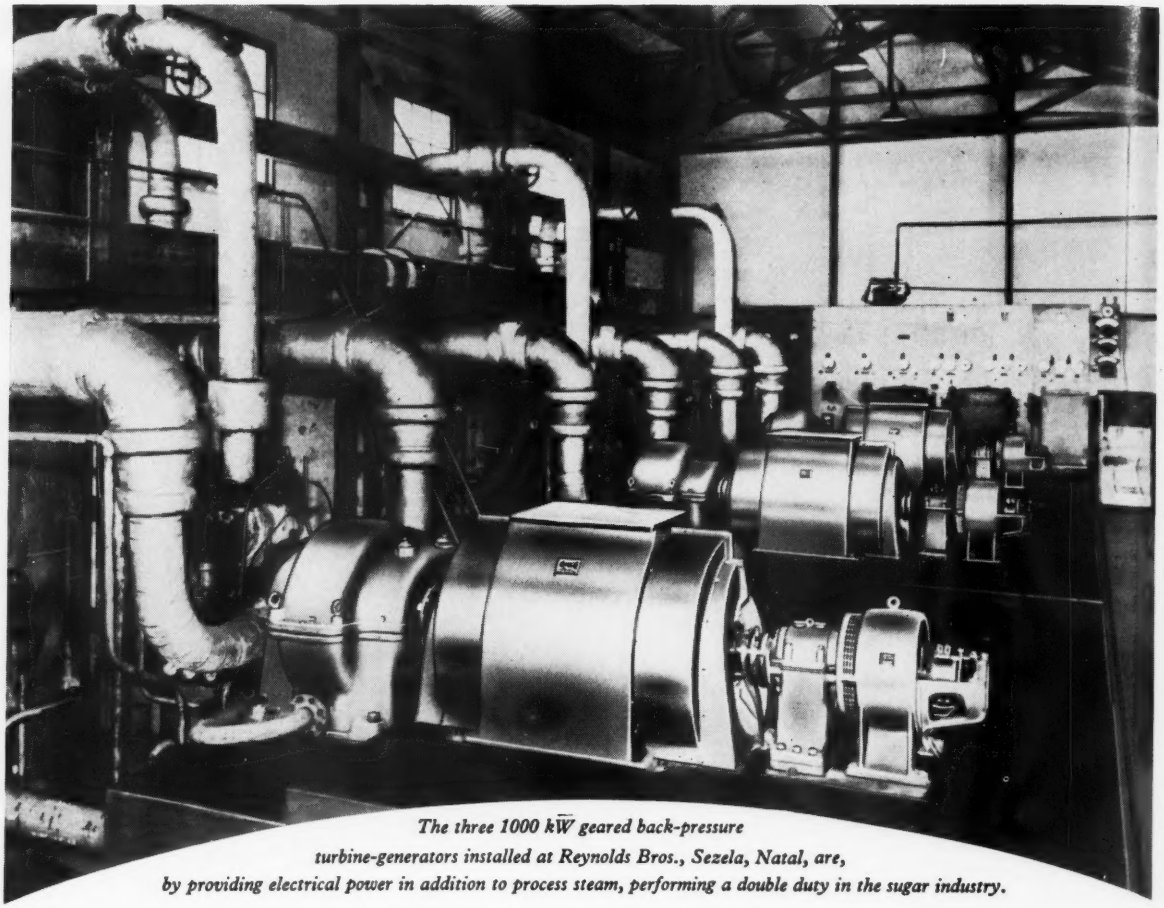
the Belmos company limited

BELLSHILL :: LANARKSHIRE

LONDON • GLASGOW • BIRMINGHAM • NEWCASTLE • MANCHESTER • SHEFFIELD • CARDIFF

A*

Geared Back-Pressure Turbines



The three 1000 kW geared back-pressure turbine-generators installed at Reynolds Bros., Sezela, Natal, are, by providing electrical power in addition to process steam, performing a double duty in the sugar industry.

-cut your fuel costs

Great advantages can be gained by installing small back-pressure turbines for heating and process steam requirements in large factories. The back-pressure turbine is relatively cheap to install, occupies little space and requires only light foundations.

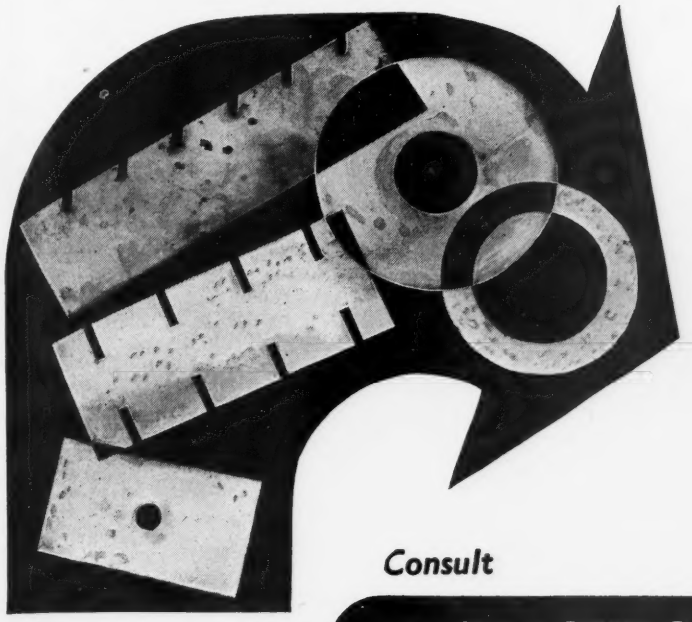
When Metropolitan-Vickers first installed one of their own back-pressure turbines at their Trafford Park Works in 1948 the cost of power and heating requirements for the factory were reduced by over £9,000 a year.

Please write for further details.

METROPOLITAN-VICKERS
ELECTRICAL CO LTD · TRAFFORD PARK · MANCHESTER, 17

An A.E.I. Company

B/L 702



for

MICA

INSULATION

Consult

EAST LONDON MICA WORKS

RINGWOOD RD., WALTHAMSTOW, LONDON, E.17

ESTD. 1912

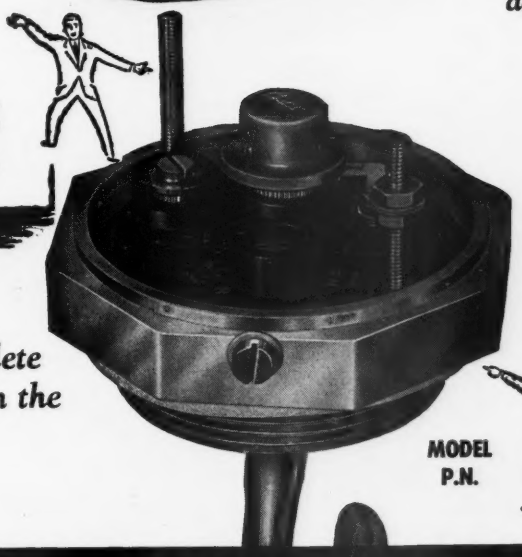
Phone:
COPpermill 2248/9
Telegrams:
Elmicmer, Easphone, London

TEMPERATURE CONTROL

by

THE THERMOSTATIC CONTROLS CO.

WE shall be pleased to submit special designs for all domestic and commercial applications, including combination units of heater and thermostat, or safety device.



HEATING ELEMENTS

by

CONTROLLED HEATING UNITS (London) LTD.

MODEL P.N.

Obtainable, complete or separately, from the same factory.

Enquiries to:—

AVENUE ROAD · HAMPTON · MIDDLESEX TEL. MOLESEY 3285/7

NOT — just cable — *BUT*

CABLE of *Quality*

WANDLE BRITISH MADE CABLE

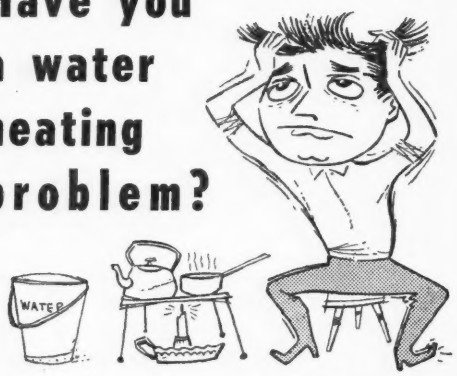
V.I.R. Taped and Braided; Tough Rubber; Lead Covered and Flexibles

WANDLESIDE CABLE WORKS LTD.

106 Garratt Lane • Wandsworth • London • S.W.18

Telephone: BATtersea 2273 (5 lines) *Telegrams: "Wandleside, London"* *London Office: 21 Fitzroy St., W.1* *LANgham 8317*

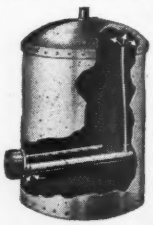
Have you a water heating problem?



. . . solve it with "DUNLOW" Electric Immersion Heaters and Circulators. Side Entry, Top Entry and External Types can be supplied. Full information on request.

The easiest heater to fit.

Side Fixing Type Circulator with mechanical flange, 2, 3 and 4 kW.



DUNCAN LOW LIMITED

57/61 TROSSACHS ST. GLASGOW, N.W.

'Phone: Douglas 6051/2/3
Grams: Immerser, Glasgow

Sheen CABLE JOINTING EQUIPMENT

the first choice for reliability

Manufactured by

HUGH PRICHARD & CO.(Nottm.)LTD.

Queen Street · Old Basford · Nottingham

Telephone - Nottingham 74373

WASHERS LTD.

93 · IRVING STREET
BIRMINGHAM 15
MIDLAND 1423

TRANSFORMERS of all types up to 25 kVA for Single or Three Phase operation, Phase Conversion, etc.

INDUCTA

COILS for Contactors, E.M. Brakes, Air Valves, etc. and COIL WINDINGS, for all purposes.

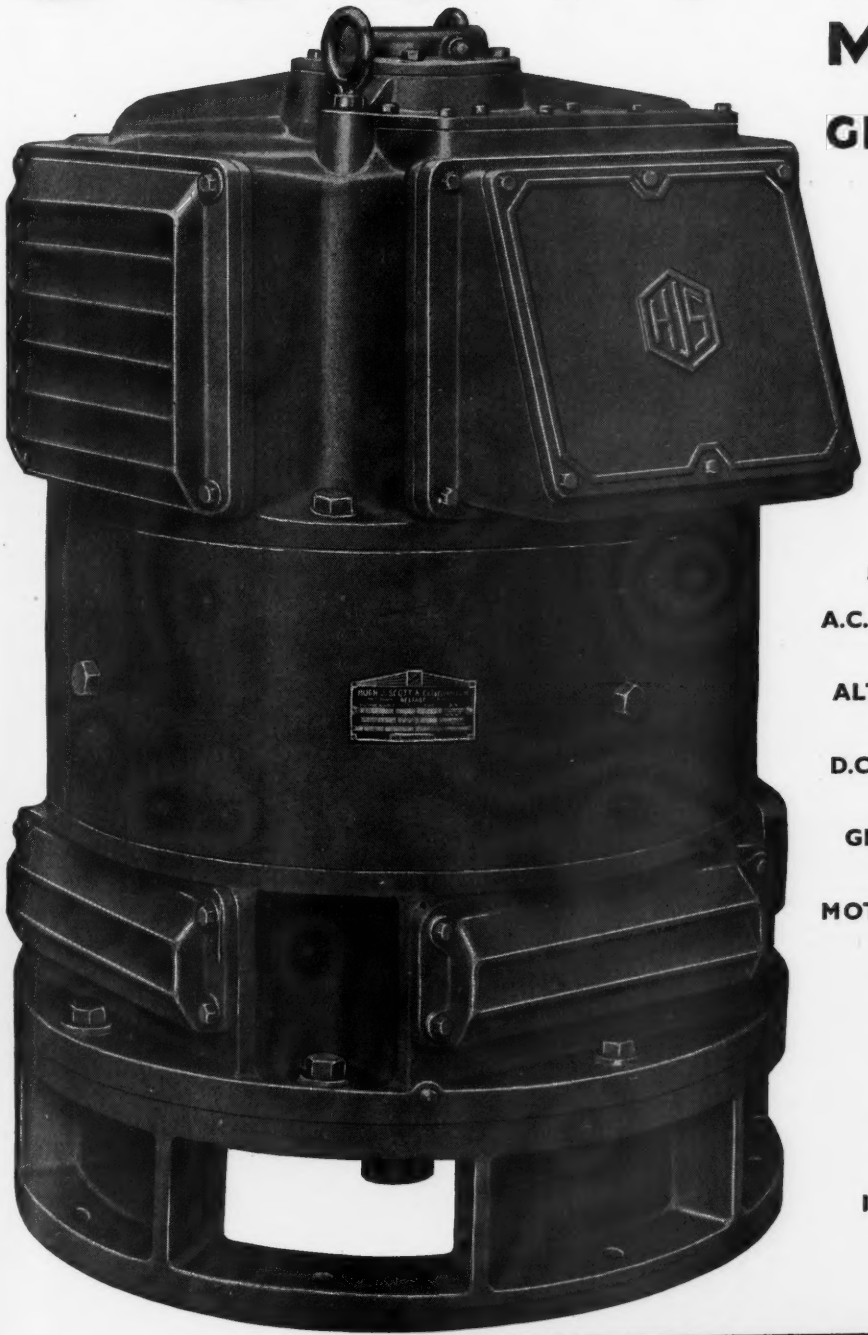
MAINS Output, and Special Purpose Transformers for Radio Equipment, Chokes, etc.

SOLENOIDS for A.C. and D.C. Operation. A.I.D. APPROVED.

W. F. PARSONAGE & Co LTD
INDUCTA WORKS
PARK RD BLOXWICH WALSALL
TELEPHONE BLOX 6464

SCOTT

A.C. & D.C. MOTORS AND GENERATORS



MANUFACTURERS OF:

A.C. MOTORS ½-350 B.H.P.

●

ALTERNATORS ½-125 kVA

●

D.C. MOTORS ½-200 B.H.P.

●

GENERATORS ½-150 kW

●

MOTOR GENERATOR SETS

●

LOOM MOTORS

●

FAN MOTORS

●

MARINE MOTORS

●

INVERTED ROTARY CONVERTERS

HUGH J. SCOTT & CO (BELFAST) LTD

VOLT WORKS BELFAST N. IRELAND

SenTerCel

Low power silicon rectifiers

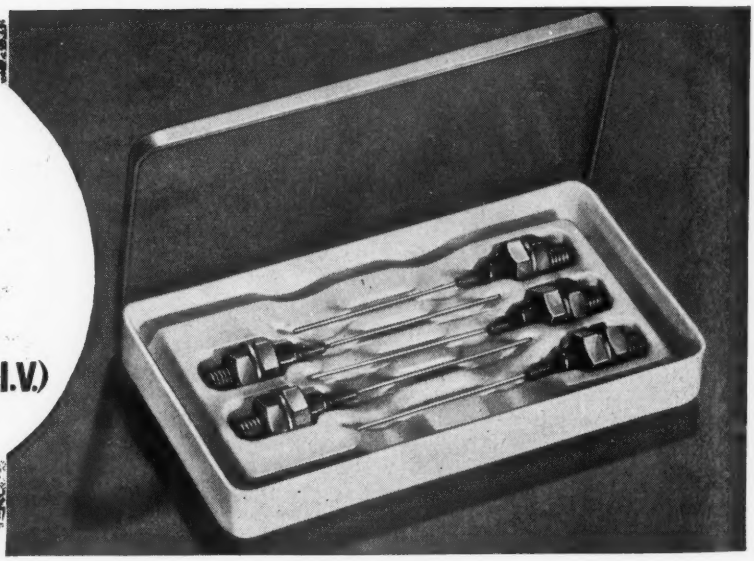
- High efficiency
- Small size
- High temperature operation
- Hermetically sealed

Now Available from Production

Write for Technical Data Sheet F/SIL 102

One Ampere

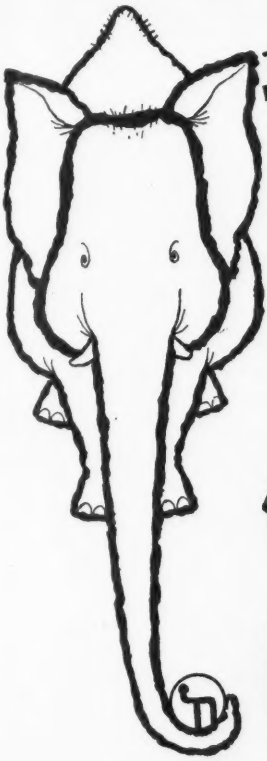
at 50, 100 or 150 V (P.I.V.)



Standard Telephones and Cables Limited

Registered Office: Connaught House, Aldwych, London, W.C.2

RECTIFIER DIVISION: EDINBURGH WAY · HARLOW · ESSEX



THE BEST IN ANY SHAPE OR FORM

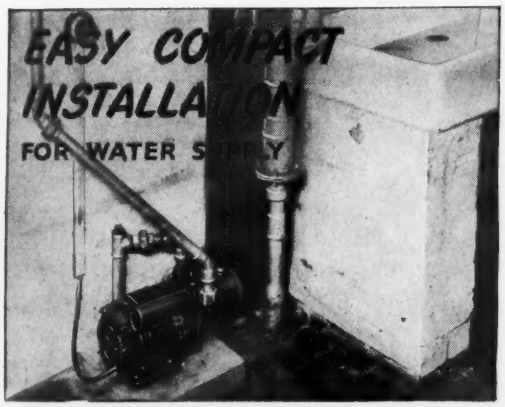
This high standard of presswork is upheld by judgement and experience gained over forty years in the production of fine quality pressings. Our claim as master craftsmen assures your complete satisfaction, both with service and workmanship. Every order is handled with extreme care and given prompt attention. We welcome your enquiry.

THE HAMPTON WORKS (STAMPINGS) LIMITED

PRESSWORK EXPERTS

TWYNING ROAD • STIRCHLEY • BIRMINGHAM

Telephone: KINgs Norton 2901 Telegrams: RADIAGILLS, BIRMINGHAM



Self-priming with a suction lift of 20 feet, the electrically driven M range of Mono Pumps are compactly constructed, flange mounted to a motor of very low power consumption. Its silent operation permits installation in any convenient position and the non-pulsating, steady flow will not transmit noise through the pipeline. No oiling or greasing of the pumping element is required and no foot valve necessary. Petrol driven or belt drive pumps are available.

The MONO pump

Obtain leaflets from your dealer or write:

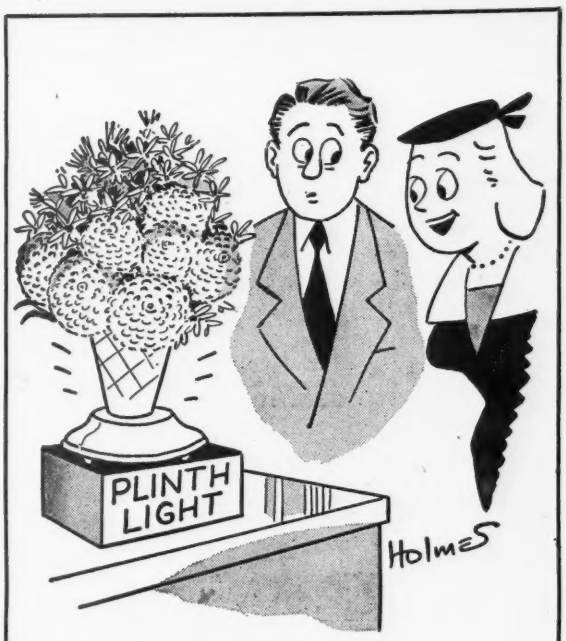
MONO PUMPS LIMITED

MONO HOUSE, SEKFORDE STREET, LONDON, E.C.1

Telephone: Clerkenwell 8911 *Telegrams:* Monopump Phone London

and at

BIRMINGHAM, DUBLIN, GLASGOW, MANCHESTER, NEWCASTLE, WAKEFIELD



"Oh! Aren't they lovely! I'll have a bunch of those."

This cartoon is reproduced by courtesy of "Electrical & Radio Trading."

But—joking apart—R.E.A.L. Plinths are steady sellers all the year round.

We are glad to announce that there will be no increase in prices this season.

THE R.E.A.L. PLINTH LIGHT

Patent No. 659,876

List No. 5000

36/9 each inc. P.T.

THE R.E.A.L. JUNIOR PLINTH

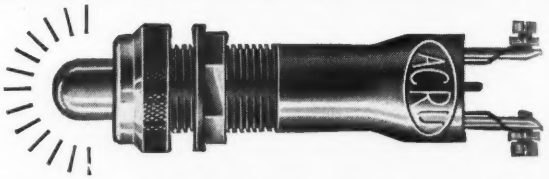
List No. 5002

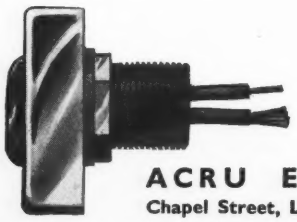
28/- each inc. P.T.

YOUR WHOLESALER CAN SUPPLY

Issued by ROWLANDS ELECTRICAL ACCESSORIES LTD., R.E.A.L. WORKS BIRMINGHAM 18

There are over 1,500 different combinations
with 40 basic components of
ACRU NEON INDICATOR LAMPS





NEW!!—*All models can now be supplied with green fluorescent bulbs giving green or blue light*

AVERAGE LIFE 25,000 HOURS!

ACRU ELECTRIC TOOL MFG. CO. LTD.
Chapel Street, Levenshulme, Manchester 19 RUSholme 4613

METAL PARTS

PAXTONS

REPETITION PARTS, MACHINING, SMALL CASTINGS, PRESSINGS, PIPE FITTINGS, CLIPS, TERMINALS, SOCKETS, UNIONS, SPRINGS, CONTACTS, EYELETS, LUBRICATORS, TAGS, NIPPLES, ADAPTORS, WING-NUTS, LUGS, CLEATS, FLEXIBLE CONNECTORS, SPECIAL WASHERS, COMPLETE ASSEMBLIES

In fact:—

Anything Small In Metal

FOR ANY TRADE

PAXTONS (ELECTRICAL) LTD.
METAL PARTS SECTION
A.I.D. and A.R.B. approved
WESTON-SUPER-MARE
Phone: 1357 Grams: 1357

Mercury switches

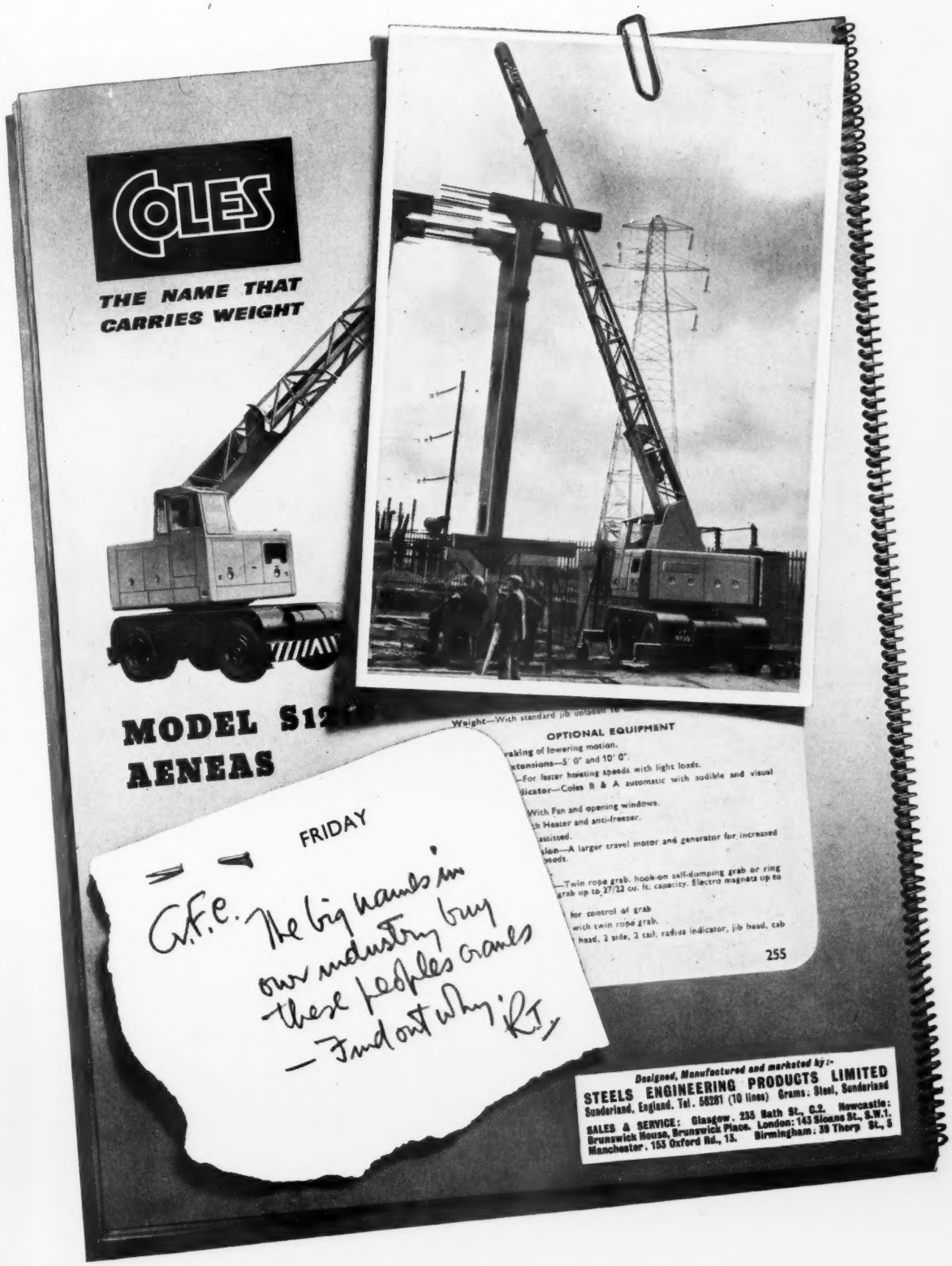
THE MERCURY SWITCH MANUFACTURING COMPANY LIMITED are the largest specialised manufacturers of Mercury Switches in Great Britain. These are made to exceptionally high and uniform standards of quality.
Since its inception in 1932, this Company has concentrated solely on the production of Mercury Switches. It has thereby obtained the widest possible experience and expert knowledge of design, manufacture and application.

THE MERCURY SWITCH MANUFACTURING COMPANY LIMITED
WEST DRAYTON • MIDDLESEX

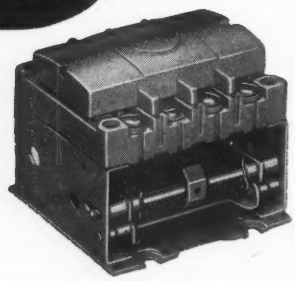
MS 12

PRESSPAHN, LIMITED
Manufacturers of
ELECTRICAL WELLSTEAD INSULATION
ELECTRICAL INSULATING MATERIALS
PRESSPAHN, LTD - BRADFORD - YORKS
Phone: Bradford 25135 PBX. Grams & Cables: "Presspahn, Bradford"

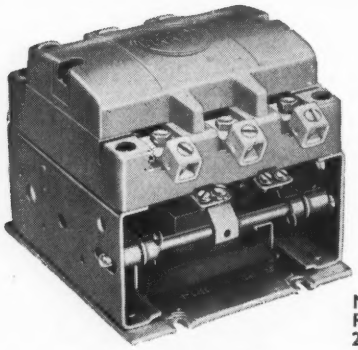
Studding • Studs • Allthreads • Tie Rods
TELCO LTD., 3 Newman Street, London, W.1 MUSeum 5701/4


COLES
THE NAME THAT CARRIES WEIGHT
MODEL S12
AENEAS
OPTIONAL EQUIPMENT
255
FRIDAY
C.F.C. The big wheels in our industry buy these peoples cranes — Find out why. R.T.
Designed, Manufactured and marketed by:-
STEELS ENGINEERING PRODUCTS LIMITED
Sunderland, England. Tel. 58281 (10 lines) Grams: Steel, Sunderland
SALES & SERVICE: Glasgow. 235 Bath St., C.2. Newcastle: Brunswick House, Brunswick Place. London: 143 Sloane St., S.W.1. Manchester. 153 Oxford Rd., 13. Birmingham: 39 Thorp St., 5

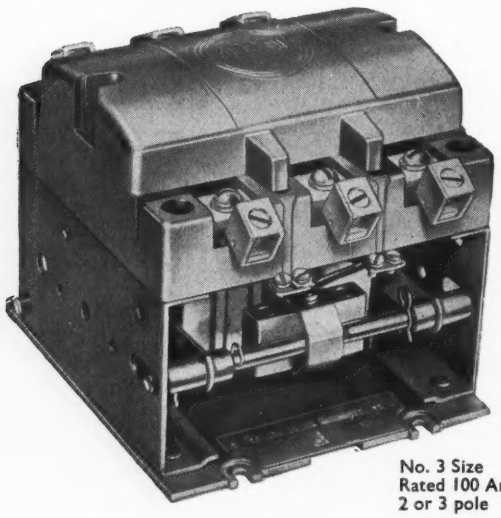
Contactors



No. 1 Size
Rated 30 Amps.
2, 3 or 4 pole.



No. 2 Size
Rated 50 Amps.
2 or 3 pole ✻



No. 3 Size
Rated 100 Amps.
2 or 3 pole ✻

- INCORPORATING THE ARROW EXCLUSIVE 'RIGHT-ANGLE' MECHANISM.
- THE SMALLEST CONTACTORS FOR THEIR RATINGS.
- ALL RATINGS AT 550v A.C. PER POLE.
- AUXILIARY SWITCHES AVAILABLE, N/O, N/C or N/O-N/C.
- ALL TYPES CAN BE SUPPLIED AS INTERLOCKED UNITS.
- TO B.S.S. 775 (Revised).
- CONFORMING TO NEMA SIZES 1, 2 & 3.
- C.S.A. APPROVED.

✻ 4 & 5 pole versions also supplied.

LATEST!

our new 15 amp direct acting contactor

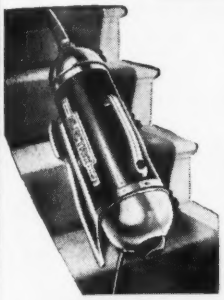
MAKE SURE YOU GET FULL INFORMATION ABOUT THE FINEST CONTACTORS MADE TO-DAY—FREE ON REQUEST FROM—

ARROW

ARROW ELECTRIC SWITCHES LTD · HANGER LANE · LONDON · W.5.

AI8

make



'UP THE STAIR'
VACUUM CLEANER

Silent and smooth running, follows the housewife upstairs. Attachments for every job.

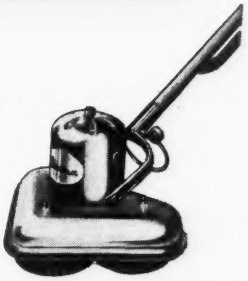
RETAIL PRICE **£27.16.0** (inc. P.T.)

Electrix

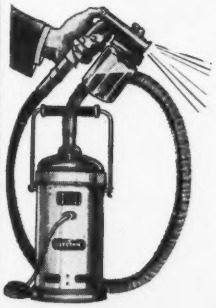
FLOOR POLISHER

Polisher and Scrubber suitable for wood, tiles and lino. Lambswool polishing pads included.

RETAIL PRICE **£22.18.0** (inc. P.T.)



products



SPRAYER UNIT

Portable Sprayer Unit with 101 uses. Enables the householder to do many jobs — quicker, easier and for far less cost.
The original and the best.

RETAIL PRICE **£9.7.0** (no tax)

your business!

Further information and literature from:—

ELECTRIX LIMITED
STERLING WORKS
DAGENHAM · ESSEX · ENGLAND

TEL: DOMINION 4545/55 · GRAMS: STERLING, DAGENHAM

"ELMO"

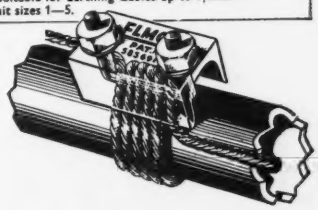
EARTHING CLAMPS

A COMPLETE RANGE TO B.S.951. 1948 IN 4 SIZES

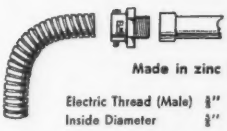
	A123	B45	C67	D8910
for earthing cables up to	7/0.036"	7/0.064"	19/0.064"	19/0.083"
to fit B.S. conduit sizes i.e. in trade terms	1, 2 & 3 ½" to ¾"	4 & 5 1" and 1¼"	6 & 7 1¼" and 2"	8, 9 & 10 2¼" to 3½"

NOTE ALSO: Type A123 is suitable for Earthing Cables up to 7/0.029" and for B.S. conduit sizes 1—5.

"Elmo" Earthing Clamps are of robust construction. Impossible for wire to pull out, always under tension, therefore a most satisfactory earth and a permanent safeguard.



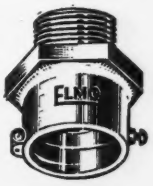
ELECTRICAL FITTINGS



Flexible-to-rigid
CONDUIT COUPLINGS

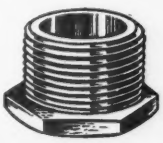
Made in zinc base alloy in the following sizes:

Electric Thread (Male)	⅜"	½"	1"	1¼"	1½"	2"
Inside Diameter	⅜"	½"	1"	1¼"	1½"	2"
Electric Thread (Male)		⅜"	½"	¾"	1"	1¼"
Inside Diameter Flexible Conduit		½"	⅝"	¾"	1"	



WITH EARTHING TERMINAL

Special Features: Integral Earthing Terminal, tinned ready for soldering. Fixing screw for continuity. Internal threads suit all makes of flexible tubing.



MALE
Hex. Section

CONDUIT BUSHES
Made in the following sizes:

MALE: Electric Thread
⅜" ½" 1" 1¼" 1½" 2"

FEMALE: Electric Thread
⅜" ½" 1" 1¼" 1½" 2"

FEMALE
Flat Face Section for Spanner (except ⅜" size, which is round)

CONDUIT HOOK

For fluorescent lamps and overhead lighting fittings. Screwed ⅜" thread, male electric.

Made to fit all standard boxes with two holes 7/32" diameter — 2" centres diametrically opposed. Designed in accordance with British Standard Specification.

Both made in aluminium alloy

CEILING PLATE
One hook

Manufactured by M.MOLE & SON LTD.
BIRMINGHAM · 3 · ENGLAND Est. 1835

TOROSTATS

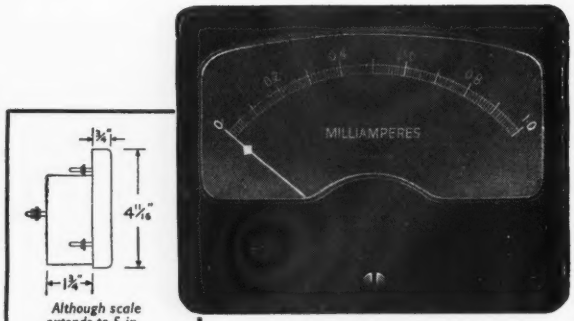
TOROIDALLY WOUND POTENTIOMETER-RHEOSTATS

Cressall Torostats are a particularly robust form of vitreous enamelled toroidal potentiometer on a ceramic base. This construction gives great mechanical strength and good heat dissipation. Cressall contact brush design ensures perfect contact with negligible wear.

Made by Cressall

THE CRESSALL MANUFACTURING COMPANY LIMITED
(A subsidiary of The Expanded Metal Company Limited)
ECLIPSE WORKS · TOWER STREET · BIRMINGHAM 19 Telephone: Aston Cross 2666
LONDON OFFICE · BURWOOD HOUSE · CAXTON ST. · S.W.1 Telephone: ABBey 7766

A new 6-inch rectangular moving coil instrument . . .



Although scale extends to 5-in., body diameter is only 3¼-in.

Illuminated model

This new instrument is available either in **illuminated** model (effected internally) with black dial and white scale and pointer, or **non-illuminated** with white dial and black scale and pointer. It can be provided in either B.S.S. 89, 1954 Industrial or Precision Grade accuracy. The two Pea lamps employed for illumination are easily replaced from the front.

SIFAM

Available as D.C. or A.C. Rectifier; Voltmeters, Ammeters, Milliammeters and Microammeters, or as H.F. Thermocouple: Ammeters and Milliammeters.

Write to: **SIFAM ELECTRICAL INSTRUMENT CO. LTD.**
LEIGH COURT — TORQUAY — Telephone 4547/8

FURSE

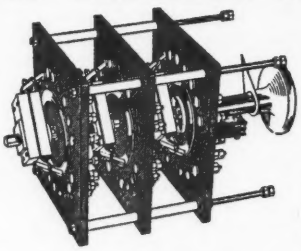
LIGHTNING CONDUCTORS
and Earthing Equipment

Largest Manufacturers and Exporters in Great Britain

Advisory and technical information service free — complete schemes and estimates. Illustrated literature on request.

W. J. FURSE & CO. LIMITED
33 Traffic Street (Tel. 88601–3 lines) NOTTINGHAM
Also LONDON, MANCHESTER, BIRMINGHAM, BRISTOL

H.B. TRANSFORMER TAPPING SWITCH TYPE L



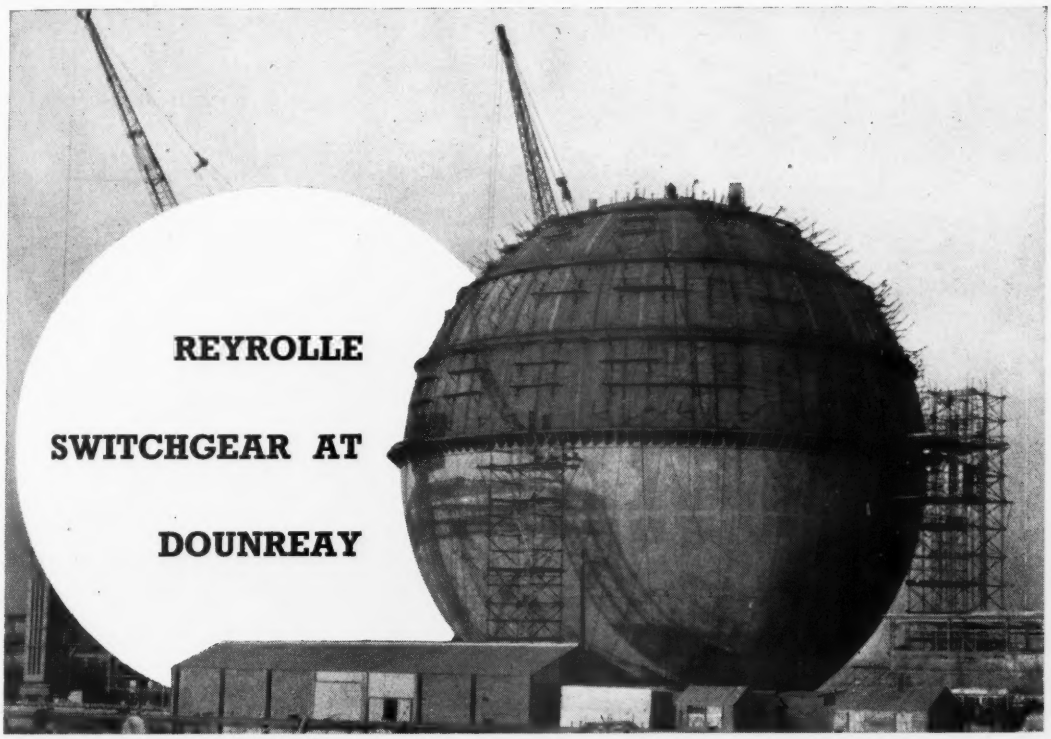
Interlocked with micro break switch

Pull Handle to release Lock, then turn

Also Type O without interlock and Type C for on load switching

SINGLE OR MULTI POLE
Phone: Kings Norton 1604

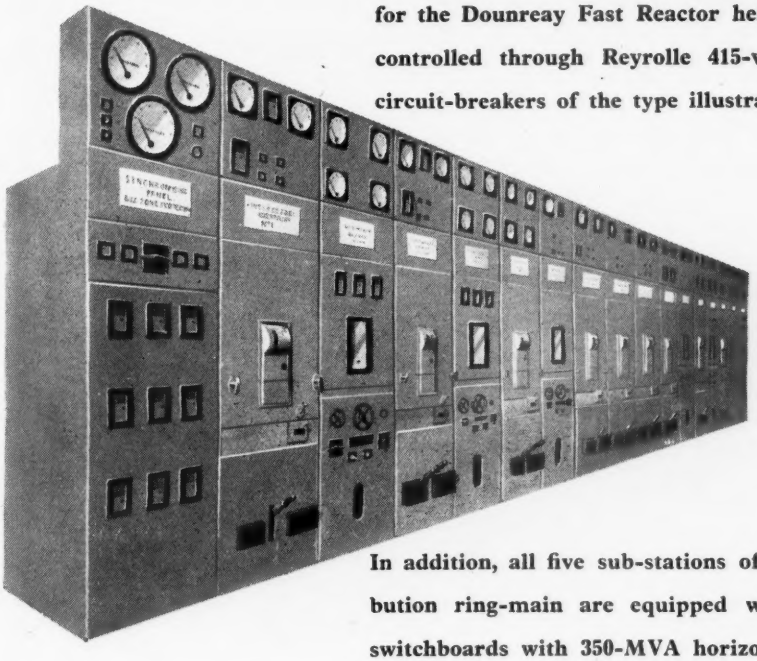
HENLEY BURROWES & CO. LIMITED
Factory Centre: KINGS NORTON, BIRMINGHAM



REYROLLE SWITCHGEAR AT DOUNREAY

Photograph by courtesy of the U.K.A.E.A

The electro-magnetic liquid-metal pumps and other services for the Dounreay Fast Reactor heat-exchanger system are controlled through Reyrolle 415-volt 31·5-MVA air-break circuit-breakers of the type illustrated.



17-panel switchboard comprising Reyrolle type-S22A air-break circuit-breakers with associated control cubicles.

In addition, all five sub-stations of the main 11-kV distribution ring-main are equipped with Reyrolle metalclad switchboards with 350-MVA horizontal draw-out oil-break circuit-breakers.

Reyrolle

A. Reyrolle & Co. Ltd · Hebburn · County Durham · England

ARE YOU A VANE, AN ANODE OR ROD?

whatever you are, whatever you do,
your specification puts you apart,
you musn't be this, you've got to be that;
to make you at all they can't even start
till problems are solved and properties used
that Morganite Carbon alone can impart.

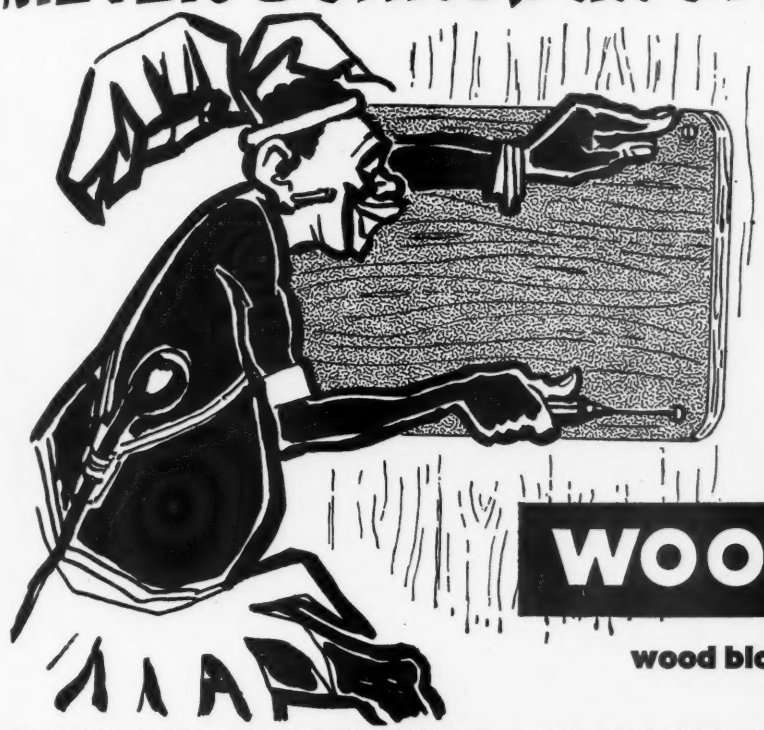
For the design engineer Morganite Carbon is a material with a vast potentiality; some of its properties are unique, many can be varied to obtain specific characteristics. A material which is strong as steel but light as aluminium, which is self lubricating, has some exceptional electrical properties yet is non-metallic, must have a multiplicity of applications. When you have read the other properties of Morganite Carbon, why not have a talk with our technical staff? They may be able to help with your problem.

OTHER PROPERTIES INCLUDE:
High resistance to wear. Wide range of resistance to chemical attack. Machinability. Good thermal conductivity. Not wetted by molten metal or slags. Non-seizing. Non-galling. Good mechanical strength at high temperatures. Good electrical conductivity. Available in impervious forms. Low thermal expansion.

MORGANITE CARBON

THE MORGAN CRUCIBLE CO. LTD., BATTERSEA CHURCH ROAD, LONDON, S.W.11. Phone: BAT. 8822
C53A

METER BOARDS all over the world



and in all climates

Me fella know Wootton good Meter Board. It gives big time service. Me fella fix it quick. White boss say best tested plywood is sure used in Wootton Meter Board. Yes sah !

WOOTTON

wood blocks, sunk switch boxes, instrument cases

WOOTTON & CO. LTD • ALMA WORKS • PONDERS END • MIDDLESEX • *Tel.: Howard* 1858

ISMAY ART CANDLE LAMP

In 25W. and 40W. White Opal or colour sprayed champagne, red or green. Standard Caps. B.C. and S.B.C.

All enquiries to:

ISMAY LAMPS LIMITED

Roden Street Works, Ilford, Essex

Telephone: ILFORD 1153

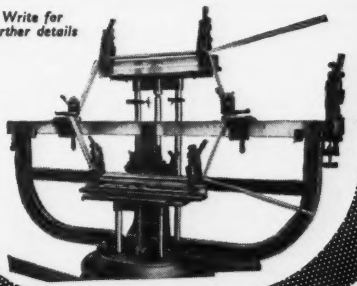
QUICKWAY

coil winding machine

Used by leading manufacturers and repairers of electrical equipment, the "Quickway" coilwinding and forming machine produces a wide range of uniformly shaped armature and stator coils.

The standard machine produces formed coils up to 28" loop length and this range can be increased to 42" loop length by additional attachments.

Write for further details



THE MIDLAND DYNAMO CO. LTD.

QUICKWAY WORKS, LEICESTER

Tel. 20172 (5 lines) Grams: "DYNAMO," Leicester

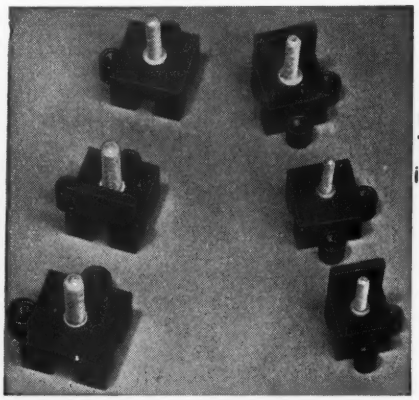
H.R.C. Cartridge Fuse Links

- B.S.88 CATEGORY OF DUTY, AC4
- A.S.T.A. TEST CERTIFICATE Nos. 2050–2054
- **Ratings up to 300 Amps, 440 Volts**
- *Illustrated Pamphlet and Price List from—*

L. WEEKES (LUTON) LIMITED

- **WINGATE ROAD, LUTON, BEDS.**
- *Telephone: LUTON 278 Telegrams: "SAFETEE, LUTON"*

*No longer **NEW** but accepted.*



Unit construction TER-MATE inter-locking terminal blocks

Patented

Repeating orders and C S A Approval confirm the adaptability of these terminals which are now available in stud sizes ranging from 4. B. A. to 5/16" moulded in bases 5/8" square to 1 1/4" with or without barriers.

Any shape, any number of ways, anywhere, all as an integral unit, ideal for panels etc.

Samples and literature on request:—

ELECTRIC REPAIRS (NOTTM) LTD.
NOEL WORKS : ELSON STREET : NEW BASFORD : NOTTINGHAM
Tel. Nottm. 76638

THE MERITUS

HIGH CURRENT NEUTRAL LOOP IMPEDANCE AND CONTINUITY TESTER

SHOCKPROOF AND SAFE FOR OPERATOR AND INSTRUMENT

This instrument will SAFELY carry out tests on electrical installations and appliances as recommended in the I.E.E. Regulations, 13th Edition, 1955, Section 5.

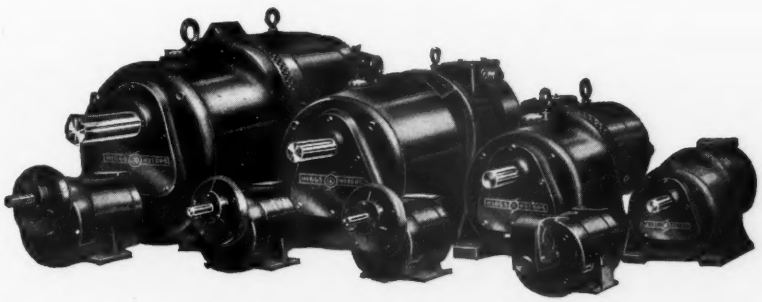
MERITUS (BARNET) LTD.
BARNET, HERTS. Bar. 2291/2

TRADE MARK

HIGGS MOTORS LTD.

MANAGING DIRECTOR DAVID C.Y. HIGGS, A.M.I.E.E.

BIRMINGHAM 6 ENGLAND



Higgs Geared Motors for Slow Speed Drives

Belfast • Bristol • Cardiff • Dundee • Glasgow • Hull • Leeds • Liverpool
London • Manchester • Newcastle • Peterborough • Sheffield • Wolverhampton

DENNIS

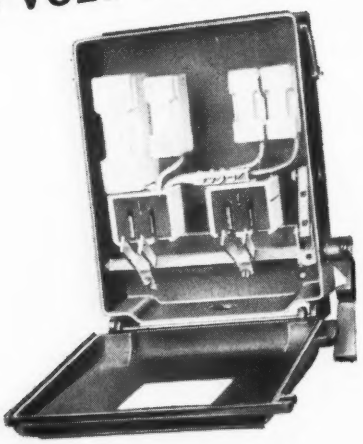
250 VOLT CONSUMERS CONTROL UNITS

with rewireable fuses

METALCLAD

A compact metalclad unit incorporating a 60 amp. c
break switch with the handle interlocking with the

List No.	D.P. Switch	S.P. & N. Fuseways amps			Overall size ins.	Cc Clea H
		30	15	5/10		
SU14	60 amp	—	2	2	$7\frac{3}{8}\times8\frac{11}{32}\times3\frac{3}{16}$	
SU3113	60 amp	1	1	2	$7\frac{3}{8}\times8\frac{11}{32}\times3\frac{3}{16}$	
SU3112	60 amp	1	2	—	$7\frac{3}{8}\times8\frac{11}{32}\times3\frac{3}{16}$	
SU3212	60 amp	2	2	—	$7\frac{3}{8}\times8\frac{11}{32}\times3\frac{3}{16}$	
SU3115	60 amp	1	3	2	$8\frac{1}{2}\times10\times4$	
SU3213	60 amp	2	1	2	$8\frac{1}{2}\times10\times$	



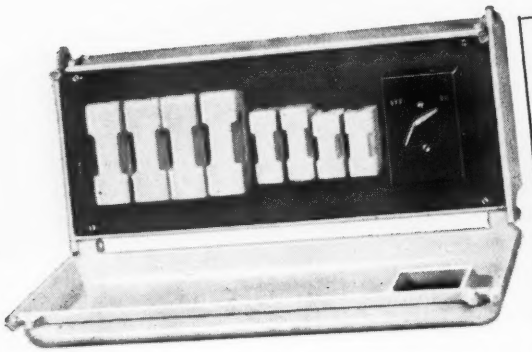
SU3113

METALC

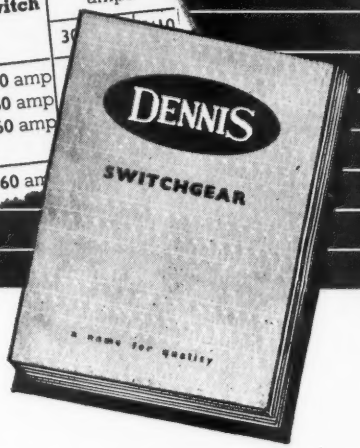
A metalclad unit of neat appea
break switch with all intercon

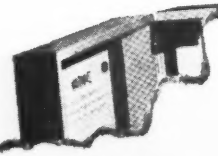
List No.	D.P. Switch	S.P. & N. Fuseways amps
		30
CU14	60 amp	
CU3113	60 amp	
CU3212	60 amp	
CU16	60 am	
CU3214		
CU3216		
CU34		

Earth



CU3414





Take a leaf from the Dennis 'book'

All users of electrical switchgear, Contractors and Wholesalers, should keep a copy of the Dennis Catalogue M.C.4, handy for constant reference. This gives comprehensive information of the Dennis range of Switchgear which is readily available to meet the everyday demands of the Electrical Engineer.

DENNIS

G. P. DENNIS LTD., SPEKE, LIVERPOOL ***Telephone: Hunts Cross 2241 (5 lines)***

LONDON OFFICE: 417 GRAND BUILDINGS, TRAFALGAR SQUARE, LONDON, W.C.2 CVS-27

Oliver Pell Control Ltd

The Specialists in Electro-magnets for Automation and Industry

On the following pages we give up-to-date details of our current production for Automation and Industry, and make new announcements regarding our standard products

Varley
REGD. TRADE MARK

Our Technical Staff can contact you anywhere in the United Kingdom at 24 hours notice and put our design facilities and production capacity at your service —

TELEPHONE WOOlwich 1422-6 **CABLE Varlymag, Woolwich**

OR WRITE

OLIVER PELL CONTROL LTD

Cambridge Row, Woolwich, London, S.E.18
ENGLAND

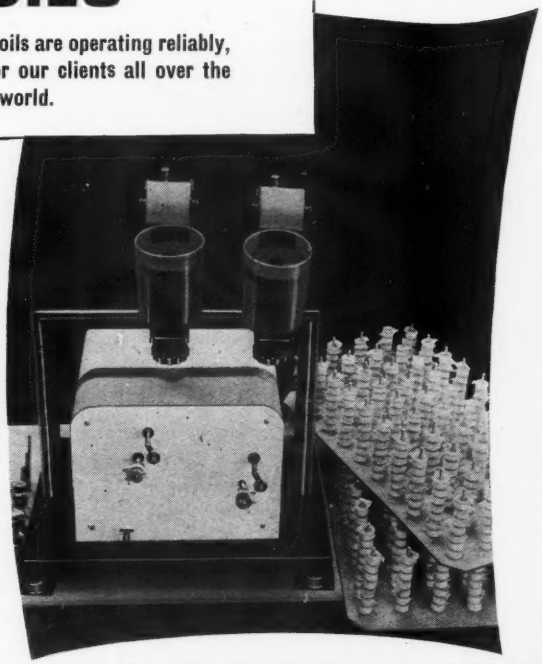
ECONOMY AND AUTOMATION Varley REGD. TRADE MARK

This is the Solenoid Coil for the reliable S.U. Electric Petrol Pump for cars. Over 5,000,000 of these Coils have been made in our Woolwich Plant for our friends The S.U. Carburettor Co. Ltd. over the past 22 years.

Varley
REGD. TRADE MARK

COILS

Millions of Varley Coils are operating reliably, in all conditions, for our clients all over the world.



This is an illustration of a "Varley" design Winding Machine, with some of the coils in current production.

Our improved techniques and the use of Nylon Bobbins enable us to produce most economically, and in large numbers, robust coils which can be suitably finished to withstand any climatic condition.

ECONOMY AND AUTOMATION

Varley
REGD. TRADE MARK

The feed mechanism on this giant Wickman $7\frac{1}{4}$"-6 Chucking Automatic employs a Varley Solenoid.

Varley

REGD. TRADE MARK

SOLENOIDS

The largest range of Standard, built for Stock Solenoids available at economical mass-produced prices.

We have a Solenoid to meet YOUR needs.

Varley Miniature Solenoids are built into this Samastronic Machine, produced by Messrs. Powers-Samas Accounting Machines Limited of Croydon.

ECONOMY AND AUTOMATION

Varley

REGD. TRADE MARK

A Food Mixer Motor, being currently massed-produced in our Woolwich Factory

Varley
REGD. TRADE MARK

TAILOR-MADE ELECTRICS

We have an infinite capacity for the production of decimal Motors and Vibrators for Industry — either for clients' design, or redesigned by us for mass production.

An Electric Shaver Unit, mass-produced for the world-famous Ronson Razor, made by our friends Messrs. Ronson Products Ltd.

ECONOMY AND AUTOMATION

Varley
REGD. TRADE MARK

The complete range of B & R Co-axial and Industrial Relays is now fully developed. These reliable time-tested relays are now available at short notice at low prices.

B&R

RELAYS

ENQUIRIES TO SALES OFFICE:

BESSON & ROBINSON LIMITED

2 Ashley Place, Victoria, London, S.W.1

Telephone: TATe Gallery 0855-9

New development plans are now in progress at Harlow and you will soon be receiving detailed information on advanced miniature plug-in or wireable enclosed relays in a fully developed state, at highly competitive prices.

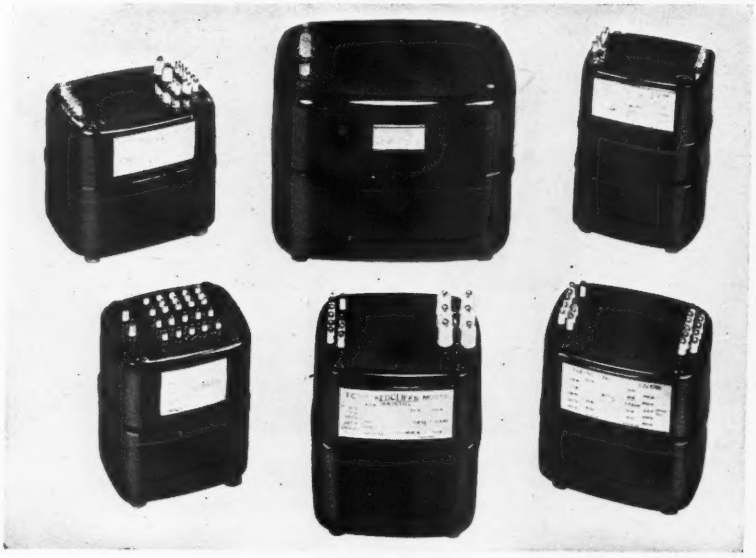
ECONOMY AND AUTOMATION B&R

TRANSFORMERS

To broaden our range and concentrate 'know-how' in this particular field, we have come to an agreement with REDCLIFFE INDUSTRIES LIMITED of Bristol, and now market

Redcliffe Transformers

through our Technical Sales Organisation.



RELIABLE REDCLIFFE TRANSFORMERS

In these pages it has only been possible to give a very slight idea
of the scope and range of our production in the electrical field.
Maybe we have what you want already in mass-production.
If not, and if it comes within our very wide terms of reference,
we can very soon arrange to make it for you—designing it first, if need be.

Once again, therefore, may we urge you to . . .

TELEPHONE WOOlwich 1422-6 CABLE Varlymag, Woolwich

OR WRITE

OLIVER PELL CONTROL LTD

Cambridge Row, Woolwich, London, S.E.18, England

For relays contact BESSON & ROBINSON LTD. 2 Ashley Place, Victoria, S.W.1. TATe Gallery 0855/9

ECONOMY AND AUTOMATION **Varley** REGD. TRADE MARK

Careers in Electricity

This is an extract from a recorded interview with E. O. Maxwell, an established C.E.A. engineer, aged 26.

"...in Power Stations I could get variety and responsibility"

Q.M.: **What first made you come into the Industry?**

Mr. Maxwell: I saw an advertisement for graduate training and it struck me that in power stations I could get the type of experience I wanted—variety and responsibility.

Q.M.: **Any particular reason why you chose this part of the world?**

Mr. Maxwell: Only that my people were living in the South of England so I voted to do my training here.

Q.M.: **After your training . . .?**

Mr. Maxwell: I was appointed Assistant Engineer—plant testing—Croydon B. My first ambition, of course, was to be in charge of a shift.

Q.M.: **Which you were. Weren't you a Charge Engineer before you were 23?**

Mr. Maxwell: Yes. Assistant two years and two months, then Charge Engineer. I was very keen on being responsible for staff and it suited me fine.

Q.M.: **What are your plans now?**

Mr. Maxwell: Well, my plan at the moment is to gain as much experience of the design and construction—construction side mainly—of nuclear power stations. Actually I shall be going, for two years, to one of the Atomic groups in about four weeks' time. My ultimate aim is really to get back into power stations.

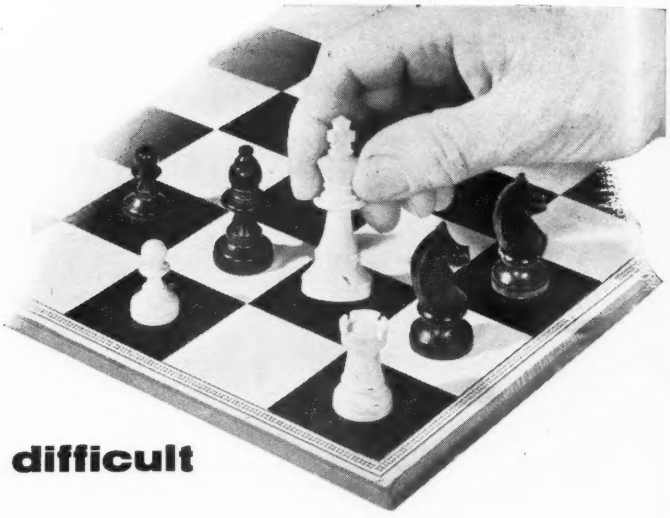
Q.M.: **You don't see yourself spending all your time in a nuclear power station?**

Mr. Maxwell: Oh, no. I'm much too young at the moment to specialise. I want to get as much general experience as I can.

We'd like to publish more of this interview, but there isn't space. For details of the many careers in Electricity Supply, and the salaried training schemes available, please write to:

The Education and Training Officer,
Central Electricity Authority,
12 Winsley Street,
London, W.1.

CEA



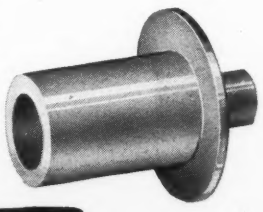
The choice is often difficult

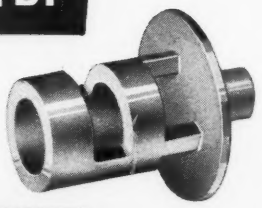
Take the matter of Die Castings vs. Hot Pressings. Each method has its own advantages for producing dimensionally accurate components.

DIE CASTINGS in Brass, Bronze or Aluminium, cut costs by the reduction of machining and finishing operations and by the virtual elimination of machining allowances.

BRASS PRESSINGS, again, can be produced so rapidly that, in many cases, the nett unit cost is lower by this method than any other.

The problem, therefore, is to choose the most suitable and economical process for YOUR specific needs. And that is where we at the Non-Ferrous Die Casting Company can help: we can advise you well for we make *both* . . . Together with our associate company, Brass Pressings (London) Ltd., we conduct joint operations under one roof, sharing administrative and technical personnel, and the same metallurgical laboratories. Our recommendations to you are therefore sound and unbiased.





BRASS PRESSINGS (LONDON) LTD.

Remember, whenever you require a constant or phased supply of dimensionally accurate parts in Brass, Bronze or Aluminium — contact us *first*. Should you wish, we will be pleased to send a Technical Representative to discuss your problem.

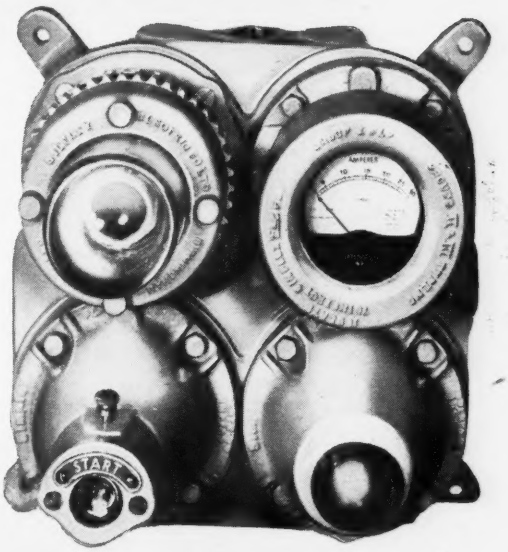
THE NON-FERROUS DIE CASTING CO., LTD.

Nonferdica Works, North Circular Road, London, N.W.2. Telephone: GLAdstone 6377

45

a possible 30,000 combination assemblies

Simplex M.M. Flameproof Accessories



This range comprises
4 switches
6 push-button units
12 pilot lights
and a series of
volt and ammeter units

Any or all of these may be mounted either on the specially designed 4 gang conduit box, or on a Simplex Flameproof standard large circular conduit box . . . in any of thirty thousand different combinations!
5 amp. 440 volt

BUXTON FLP CERTIFIED

I FLP 3431 & 3275 | II FLP 3432 | III FLP 3276

Write for illustrated leaflet

Simplex

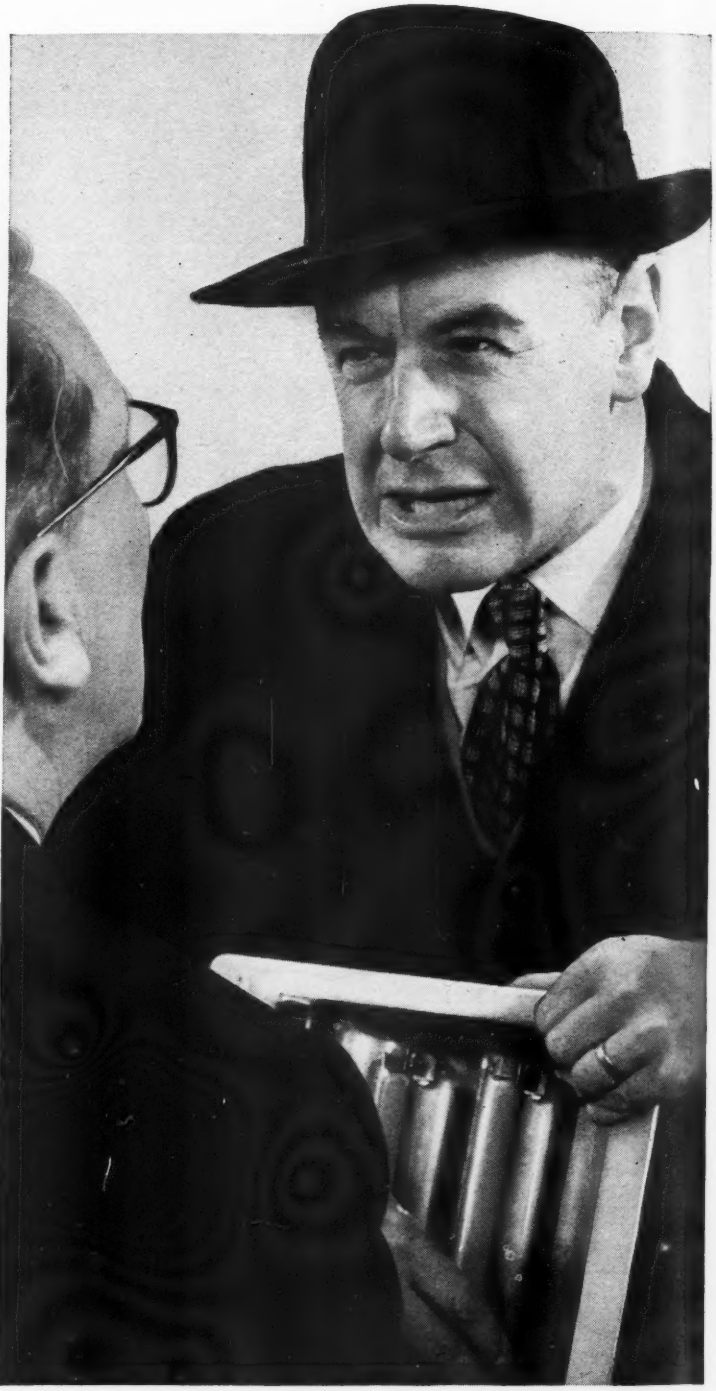
flameproof equipment

Simplex Electric Co Ltd
Oldbury Birmingham

A COMPANY

When Mr. Stone gets excited

HE SHOUTS



If his excitement is caused by dissatisfaction with a purchase, he may shout your name but spiced with adjectives, giving other customers a bad impression of your product. 'Just what Mr. Stone intends', you may say. 'It's grossly unfair. What failed was not my part of the product, but a component supplied by someone else.' But remember! Mr. Stone, who is not an electrical expert, trusted your reputation and now feels let down. The only way an electrical heating appliance manufacturer can guard against this is to incorporate materials of known dependability. Brightray nickel-chromium alloys have long proved their quality and dependability for electrical heating elements.

BRIGHTRAY

ELECTRICAL RESISTANCE ALLOYS

Produced in the form of Rod, Wire, Strip and Tape

BRIGHTRAY C for intermittent heating up to 1150°C ... used in cookers, toasters, laundry irons, fires, soldering irons...

BRIGHTRAY B produced to provide a cheaper but satisfactory material for elements working up to 950°C...

BRIGHTRAY S for continuous heating up to 1150°C ... principally intended for electric furnace heating elements...

BRIGHTRAY F for electric furnace elements operating in special atmospheres up to 1000°C...

WILCO-WIGGIN THERMOMETALS in many grades for thermostatic devices controlling temperatures ranging from −75 to 540°C.

'BRIGHTRAY' AND 'WILCO-WIGGIN' THERMOMETALS ARE REGISTERED TRADE MARKS

HENRY WIGGIN AND COMPANY LIMITED · WIGGIN STREET · BIRMINGHAM 16

TGA ER66

A-MP* modern solderless terminations

TRADE MARK

PRECISION CRIMPING ENSURES PERFECT TERMINATION

A.R.B APPROVED

SAVES TIME—SAVES COST

M.O.S. APPROVED

AVOIDS HUMAN ERROR

Pre-Insulated Diamond Grip

For single terminations or complicated cables, **A-MP** Solderless Precision Crimp methods are bringing to Industry a new high standard of positive wire termination. Wherever electrical termination is employed there are **A-MP** methods, **A-MP** terminals and **A-MP** tools to cut cost, reduce human error and speed the job to keep pace with fastest production schedules. Write or 'phone us NOW for further information.

A-MP* SYSTEMS AID EXPORTS

The **A-MP** solderless method meets wire termination specifications in foreign countries. Use of the **A-MP** method will enable you to compete in world markets. It is particularly significant that **A-MP** systems are standard practice in the U.S.A.

IMPORTANT ADVANTAGES

1. Electro-tinned high conductivity copper in one-piece construction. Termination completed in a single operation.
2. Plastic insulation *permanently* bonded to terminal barrel.
3. Serrated terminal barrel ensures maximum area of contact and great tensile strength.
4. Wire and terminal are compressed into a solid, homogeneous mass, ensuring maximum conductivity and resistance to corrosion.
5. Circumferential insulation support permits flexing of the cable without damage to the conductor or fraying of the insulation.
6. A wide variety of tongue shapes and stud hole sizes. Terminals and tools have matching colour coding for positive cable size identification.

A-MP* TRADE MARK

AIRCRAFT-MARINE PRODUCTS (GT. BRITAIN) LTD.

London Office: DEPT. 7, 60 KINGLY STREET, LONDON, W.1. Telephone: REGENT 2517-8 and 3681-2-3

Works: SCOTTISH INDUSTRIAL ESTATES, PORT GLASGOW, SCOTLAND

*Trade Mark of AMP Incorporated, U.S.A.

AP 323/43

SCREW, BOLT or CAVITY FIXINGS

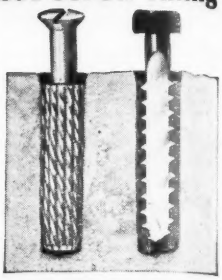
the Speediest way is best!

MODERN BUILDING MATERIALS can be a veritable nightmare to the man who has to deal with the problem of making SPEEDY, PERMANENTLY SECURE FIXINGS having either LIGHT or HEAVY LOADING CAPACITY at an economic cost.

In the RAWLPLUG RANGE there are 21 different types of Fixing Devices, with a tremendous variety of applications. They provide the complete answer to every fixing problem in every kind of material. THE RAWLPLUG RANGE also includes 14 different types of tools for hole boring.

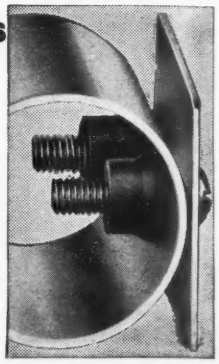
The world's speediest screw fixing

Rawlplugs make firm screw fixings in brick, tiles, cement, stone, etc., in a fraction of the time taken by any other method. Drill the material, insert the Rawlplug, screw up—it's as simple as that! Safe, permanent, and completely reliable in any climate. For all screw sizes up to $\frac{3}{4}$" coach screws.



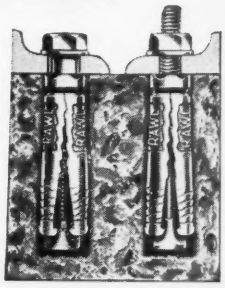
For Cavity fixings

For almost impossible jobs use the Rawlnut. (You can even make a fixing to a pipe). The tapped nut in the end of the rubber bush is drawn up to the reverse face of the material by turning the screw. The result is an airtight, watertight, vibration-proof fixing of enormous strength. For thin plastic, metal, wallboard and hollow pot, etc., it is invaluable.



Bolt it down in minutes!

For light or heavy bolting jobs, no other method even *begins* to approach Rawlbolts for strength, ease and speed. Rawlbolts are a *dry* fixing, they grip at once by expansion—no cold chiselling, no grouting in, no waiting for cement to harden. In all bolt diameters up to 1" in either loose bolt or bolt projecting types.



RAWLPLUGS WALL PLUGS

The World's Largest Manufacturers of Fixing Devices

21 DIFFERENT TYPES OF RAWLPLUG FIXING DEVICES!

For Speed and Strength!

HAVE YOU A FIXING PROBLEM? ***For FREE TECHNICAL SERVICE send full details to:—***

THE RAWLPLUG COMPANY LIMITED · CROMWELL ROAD · LONDON · S.W.7

For continuous use at 130°C

Teramel is BICC's new polyester enamel covering for winding wires. It combines the excellent electrical and mechanical properties called for in BS 1844/1952 with high thermal stability—*Teramel wires can safely be used at continuous temperatures of 130°C.*

They are ideal for:—

- **Armature and field windings for industrial and traction motors**
- **Air cooled windings for transformers**
- **Coils for motor starters**

BICC TERAMEL

Winding Wires

Hard and strongly adhesive to the copper wire. Negligible thermoplastic flow.

Flexible — can be twisted, stretched or flattened without damage.

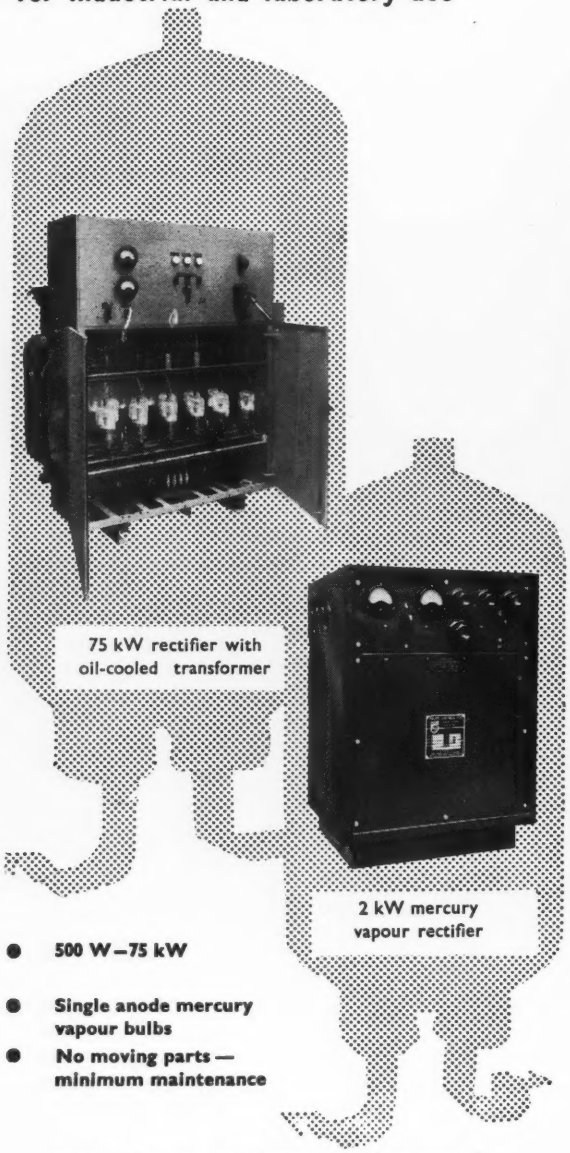
Resistant to varnish solvents, moisture and chemically contaminated atmospheres.

Further information is contained in Publication No. 391 — available on request

BRITISH INSULATED CALLENDER'S CABLES LIMITED, 21 Bloomsbury Street, London, W.C.1

Electronic Rectifiers

for industrial and laboratory use



- **500 W–75 kW**
- **Single anode mercury vapour bulbs**
- **No moving parts — minimum maintenance**

Leaflet PI 4474, giving details of standard range of Philips Electronic Rectifiers, gladly sent on request.

Rectifiers can also be made to individual requirements, e.g. to fit in with site conditions. Technicians will visit your premises and advise without obligation on suitable equipment. Please contact :-

Electrotechnical Department

PHILIPS ELECTRICAL LTD

INDUSTRIAL PRODUCTS DIVISION · CENTURY HOUSE
SHAFTESBURY AVENUE · LONDON · WC2

(PI01197A)

says lovely
JOAN REGAN

CALLING ALL HURSEAL STOCKISTS!

A reminder! The Hurseal BIG PRIZE Window Display Competition opens on October 15th. Here's a not-to-be-missed opportunity to set your sales of heating appliances soaring and at the same time claim a valuable sum of cash. Start preparing now . . .

Prizewinners will receive their awards from beautiful Joan Regan, star celebrity of radio, stage and television.

The winner receives a prize of £150 and holds for a year the Hurseal Silver Challenge Cup. Second prize is £75, Third Prize £50. In addition electric panel radiators will be awarded to the winners and to ten runners-up.

The display may incorporate any Hurseal products or any of those of Sealdraught Ltd., but the theme of the display must be "for warmth and comfort 'Buy Hurseal'." Only Hurseal Heating Group products may appear and a Hurseal oil-filled electric radiator, must be featured. Our Area Managers will be viewing displays during the 3 or 4 weeks following October 15th.

Entrants should send postcard-size photographs of their displays to:—Window Display Competition, Hurseal Ltd., 299 Regent Street, London, W.1. On the back of the photograph should be the name and address of the firm and the window dresser. No entrance form is necessary. The competition closing date is October 29th.

Hurseal HEATS BETTER

HURSEAL LIMITED
229 Regent Street, London, W.1. *Tel: REGent 1051/6.*

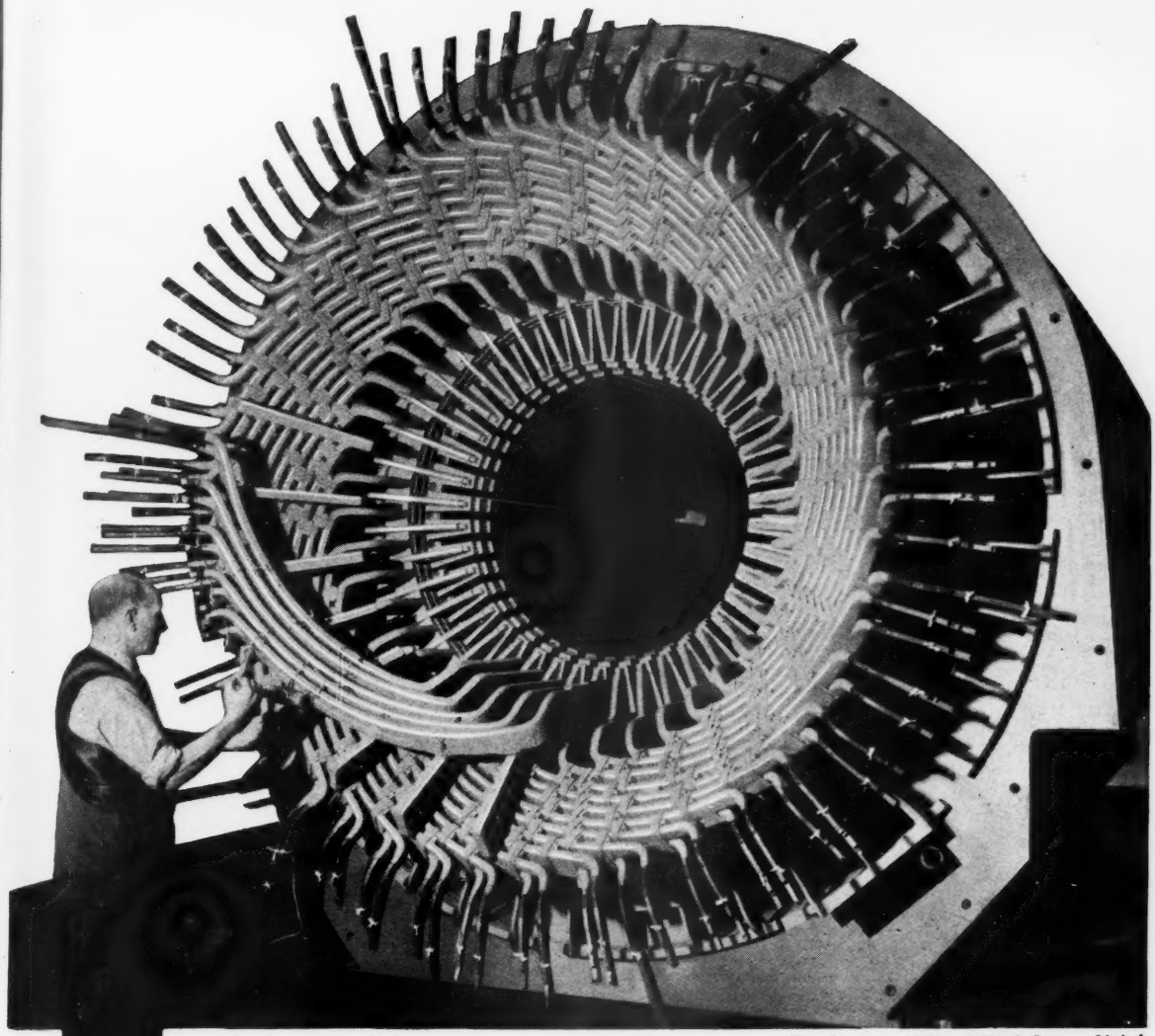


Photo by courtesy of General Electric Company Limited

Copper for the Electrical Industry

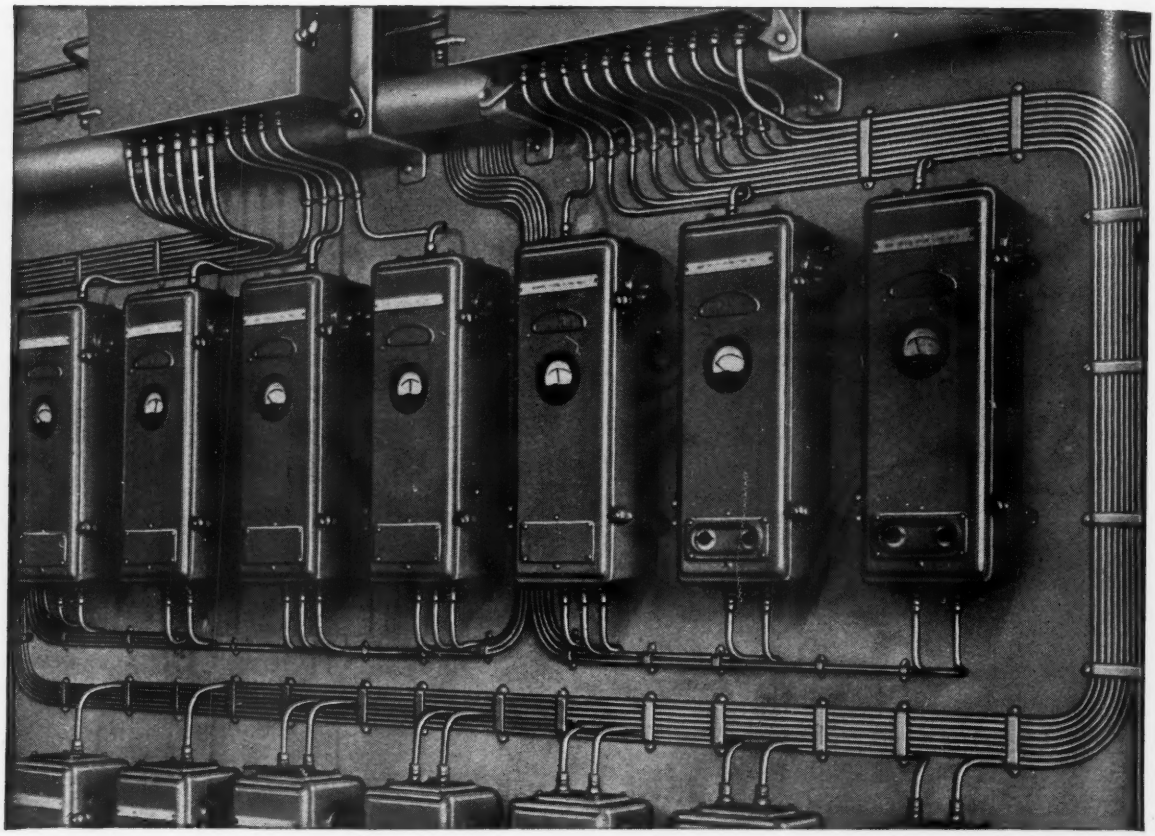
In all branches of the electrical industry to-day, there is an ever-growing demand for I.C.I. products—in particular for I.C.I. hollow copper conductors for alternators. The quality and dependability of I.C.I. copper strip, wire and sections have been fully tested in a wide range of applications—from armature and transformer windings to rotors and stators for electric motors, and electrical switchgear and contactors.

Like every product of the I.C.I. Metals Division, these provide an efficiency of service, resulting from rigid technical control during production.

ICI
METALS DIVISION

M473

IMPERIAL CHEMICAL INDUSTRIES LIMITED, LONDON, S.W.1



Photograph by courtesy of
Messrs. Prices (Bromborough) Ltd.

FACTORIES and Works Laundries, Breweries.

ATOMIC PILE installations and Research Establishments.

ELECTRIC POWER STATIONS Oil Pumping and Storage Installations.

A 'Pyrotenax' installation is not only good to look at; it is speedily installed and saves costly labour

Write for full details and "Technical Data No. D38"

Pyrotenax
COPPER COVERED MI CABLES
PERFECTED BY EXPERIENCE

NON-AGEING • NON FIRE-CAUSING
SAFE AGAINST OVERLOAD • HEAT RESISTING
MOISTURE PROOF • RESISTANT TO
MECHANICAL MALTREATMENT • RUST PROOF

CATHEDRALS, CHURCHES Galleries and Museums.

OIL TANKERS, Passenger and Cargo Ships, Warships.

PYROTENAX LIMITED
HEBBURN-ON-TYNE • Telephone: Hebburn 32244/7

LONDON: *ABBey 1654/5* • **BIRMINGHAM:** *Midland 1265* • **MANCHESTER:** *Blackfriars 6946* • **LEEDS:** *Leeds 27826* • **GLASGOW:** *Central 2238* • **CARDIFF:** *Cardiff 23689*
GD38.

Farmers sometimes grumble, it's said, about quite a number of things. But you never heard a farmer say 'Trouble with the land, is work-shy men'. You never will—while his men are countrymen. Nobody stands at the countryman's elbow to see that he sticks to the job. Nobody needs remind him that this job or that will call for patience and skill. Nobody had to persuade him to welcome the Machine. All he has said of each new box-of-tricks is 'show me how to work it'. Alton, where Alton batteries are made, is a country town where men are countrymen. Men who haven't yet learnt to believe that what's near enough right is well enough done. Men who are happy to marry the old hand skills to the use of modern machines. Men whose personal standards of workmanship have helped to build a world-wide reputation for Alton Batteries.

ALTON *Batteries of Merit*

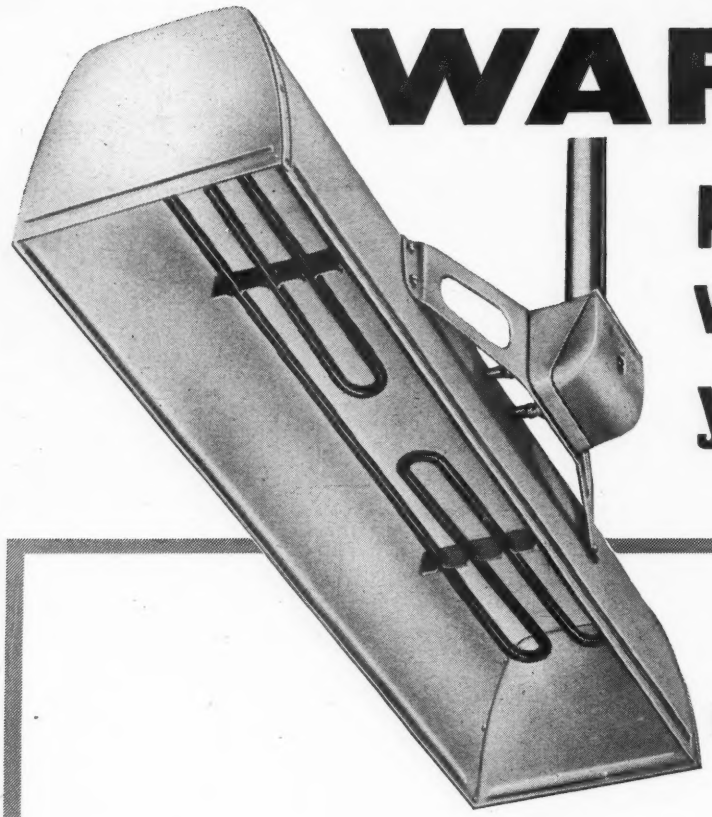
Alton stationary batteries: 10 to 15,000 ah. Also in regular production, renewal plates for all makes of battery, British and Continental.

THE ALTON BATTERY COMPANY LIMITED, ALTON, HANTS · *Telephone* : ALTON 2267 and 2268 · *Telegrams:* BATTERY, ALTON

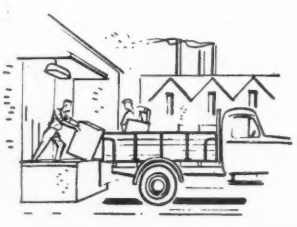
A.30

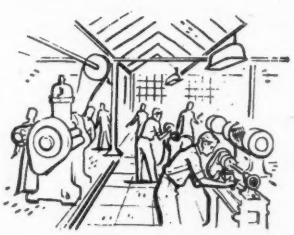
C

WARMTH projected where you need it!

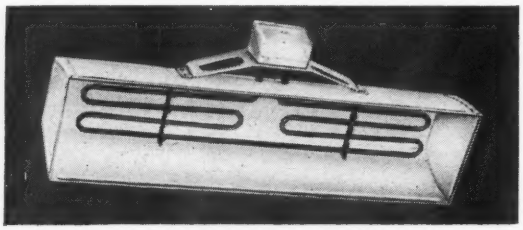


METROVICK
Radiant Space Heater





Radiant space heating is the new idea for providing warmth for people at work, waiting in queues, watching games, shopping, etc. Thus in a large building it is possible to direct heat to just those areas where operatives are working.



Available from stock

The Metrovick radiant space heater consists of an anodised aluminium reflector with a tubular sheathed heating element rated at 3 kW at specified single phase voltages. It weighs under 5 lb. and is easily erected on a single 1 in. conduit from the die-cast aluminium alloy weather-proof terminal box.

Write to us to-day for full technical details.

METROPOLITAN-VICKERS
ELECTRICAL CO LTD · TRAFFORD PARK · MANCHESTER, 17

L/I 704

An A.E.I. Company

TAKE YOUR PICK

Our wide range of capacitors, incorporating all the very latest developments, are described fully in these new leaflets . . .

SEND NOW for COPIES

DALY has succeeded in maintaining full capacity values and working voltages in more compact designs, specially suited to ultra-modern equipment:

PHOTO-FLASH EQUIPMENT • DEAF AIDS
PRIVATE TELEPHONE INSTALLATIONS
AMPLIFIERS • D.C. POWER UNITS
TRANSISTOR EQUIPMENT
MAGNETISATION EQUIPMENT
TEST GEAR

DALY
ELECTROLYTIC CAPACITORS

Condenser Specialists for over 20 years.

DALY *(Condensers)* **LTD.,** WEST LODGE WORKS,
THE GREEN, EALING, LONDON, W.5. PHONE: EALING 3127-8-9. CABLES: DALCYON, LONDON

ZENITH
(REGD. TRADE-MARK)

Insulation
FLASH TEST EQUIPMENT
with the unique safety test prods

Equipped with "VARIAC" primary control giving continuous H.T. voltage regulation from zero to maximum. Standard outputs up to 2,000 volts and 3,000 volts.

Illustrated brochure free on request.

THE ZENITH ELECTRIC COMPANY LTD.
ZENITH WORKS, VILLIERS ROAD, WILLESDEN GREEN, LONDON, N.W.2
Telephone: WILlesden 6581-5 Telegrams: Voltaohm, Norphone, London
MANUFACTURERS OF ELECTRICAL ENGINEERING PRODUCTS INCLUDING RADIO AND TELEVISION COMPONENTS

Still the Best Value in the Trade!

5 ft. 80 w. *Subject to Trade and Wholesale discounts*

Compare feature for feature— before you spend your money!

- **BACK PLATE** *FULL LENGTH—NO DUST ENTRY*
- **FIXINGS** *FLUSH—CONDUIT OR CHAIN*
- **END CAPS** *FILLED ENDS—SNUG CLOSURE ON LAMP*
- **CHOKE** *SCEMCO—WORLD RENOWNED FULLY BITUMENED FOR COOL AND SILENT WORKING*
- **STARTER LAMP** *LARGE CANISTER (CONCEALED)—ACCESS BY ENDCAP REMOVAL*
- **CAPACITOR** *TO M.O.W. STANDARD*
- **INDIVIDUALLY PACKED**

*There is NO other fitting at **ANY** PRICE with **ALL** the value features of the "SCEMCO TRIUMPH"—YOUR OWN EYES and good judgment can prove this statement.*

SCEMCO, SCEMCO HOUSE, 53 GREAT EASTERN ST., LONDON, E.C.2
(or from your usual wholesaler). Telephone: BIShopsgate 1319

SEWING -and GROWING

Up and up go the sales of the Sew-tric Sewing Machine Motor–fast-growing popularity that proves its dependability, quality and low price appeal. Get a full share of this highly satisfactory, most profitable business—send now for full details.

Sew-Tric
SEWING MACHINE MOTOR
SEW-TRIC LTD · HONEYPOT LANE · STANMORE · MIDDX.
EDGware 5261-3

TRANSISTOR A.F. AMPLIFIERS

The first systematic treatment of the subject published in Great Britain

by D. D. Jones, M.SC. and R. A. Hilbourne, B.SC.

This book, the first of its kind to be published in Great Britain, deals systematically with the design of transistor audio-frequency amplifiers, and gives the circuitry and design details of a versatile range of amplifiers, including both those for high fidelity reproduction and for public address systems with outputs up to 20 watts. This book will prove to be essential to engineers designing transistor audio-frequency amplifiers for the first time and because of its original ideas and concepts, will be inspiring to those who already have some skill in the art.

NOW READY **21s net by post 21s 10d**

from leading booksellers

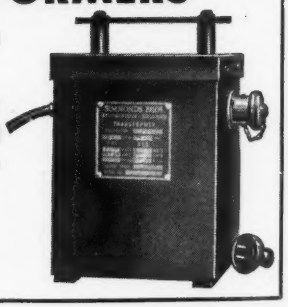
Published for "Wireless World" by

Iliffe & Sons Ltd. Dorset House Stamford St. London S.E.1

VOLTAGE DROPPING TRANSFORMERS

For Electric Tools on 110 volts

Full range of fixed and portable types in all capacities, or made to specification. *List free*



SIMMONDS BROS. STOURBRIDGE

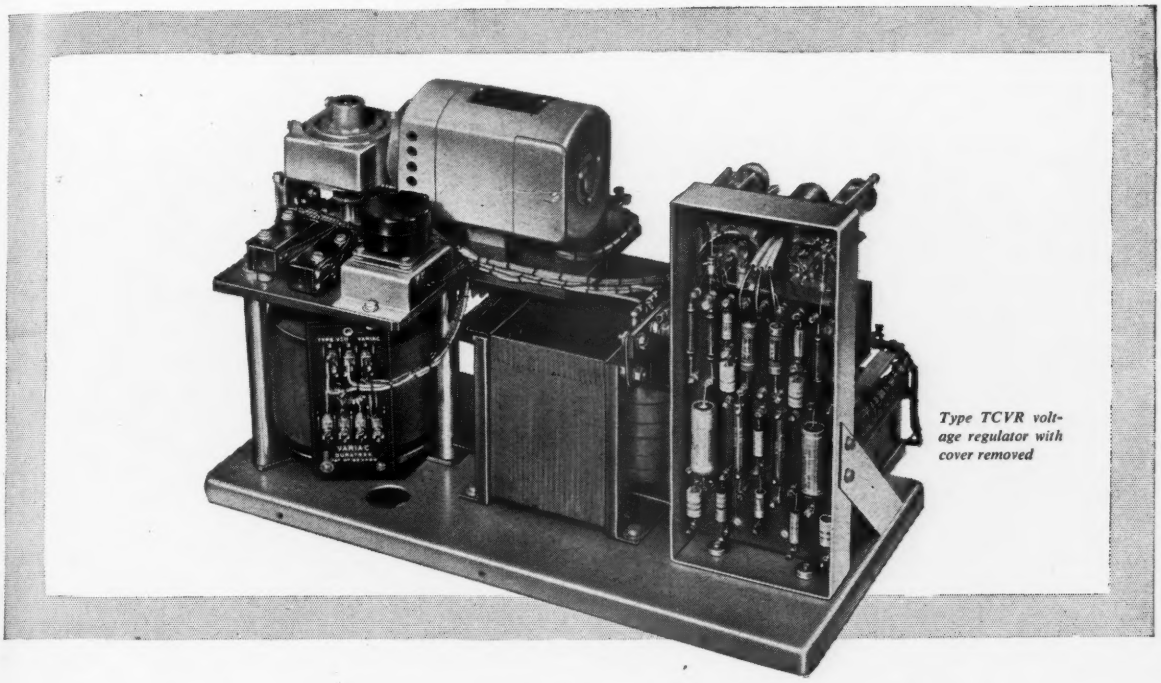
Making Connections the "METWAY"

TERMINAL BLOCKS AND CONNECTORS

- **MOULDED** 5 - 40 Amp. 1 - 12 Way
- **FLEXIBLE NYLON** 5 - 30 Amp. 1 - 12 Way
- **PORCELAIN** 5 - 60 Amp. 1, 2, 3 way, with or without centre fixing hole

For further details ask for Cat. No. OHN/32/82

METWAY WORKS, KEMP TOWN, BRIGHTON



Type TCVR voltage regulator with cover removed

Where pure waveform *and* extremely fast response are necessary at the same time, the type TCVR voltage regulator provides undistorted output waveform with a correction speed of the order of FORTY VOLTS PER SECOND.

Unaffected by frequency and load changes, the TCVR is now generally accepted as the best means of controlling the input to electron microscopes, x-ray equipment, spectrometers, computors, business machines, radio and television transmission equipment and all types of measuring and research instruments.

TCVR voltage regulators produce no harmonics and give their rated output accuracy (usually ± 0·5%) from zero to full load.

A range of models from 1·6 to 12kVA, single phase, and 4·8 to 36kVA three phase is available and any model can be fully tropicalised if required.

Specials can be designed to order. Write for our new Catalogue ref. S-574 which gives full details.

SINGLE-PHASE MODELS

TYPE No.	INPUT VOLTAGE "SWING" AROUND OUTPUT VOLTAGE*	MAX CURRENT (AMPS.)	KVA* RATING
TCVR-2750-A	−11·5 to + 8%	12	2·76
TCVR-2750-B	−15 to +10·5%	9	2·07
TCVR-2750-C	−17 to +12%	8	1·84
TCVR-2750-D	−19 to +13·5%	7	1·61
TCVR-2750-VV	200-250v	9	2·07
TCVR-7000-A	−19 to + 8·5%	32	7·36
TCVR-7000-B	−15 to + 7·5%	40	9·20
TCVR-7000-C	−11 to + 6%	53	12·19
TCVR-7000-VV	as ordered	as ordered	as ordered

** These are based on a 230v output setting : other voltages available. "VV" indicates models with variable output voltage.*

THREE-PHASE MODELS

TYPE No.	INPUT VOLTAGE "SWING" AROUND OUTPUT VOLTAGE*	MAX CURRENT PER PHASE (AMPS.)	KVA* RATING
TCVR-2750-A/3PH	−11·5 to + 8%	12	8·28
TCVR-2750-B/3PH	−15 to +10·5%	9	6·21
TCVR-2750-C/3PH	−17 to +12%	8	5·52
TCVR-2750-D/3PH	−19 to +13.5%	7	4·83
TCVR-7000-A/3PH	−19 to + 8·5%	32	22·08
TCVR-7000-B/3PH	−15 to + 7·5%	40	27·60
TCVR-7000-C/3PH	−11 to + 6%	53	36·57

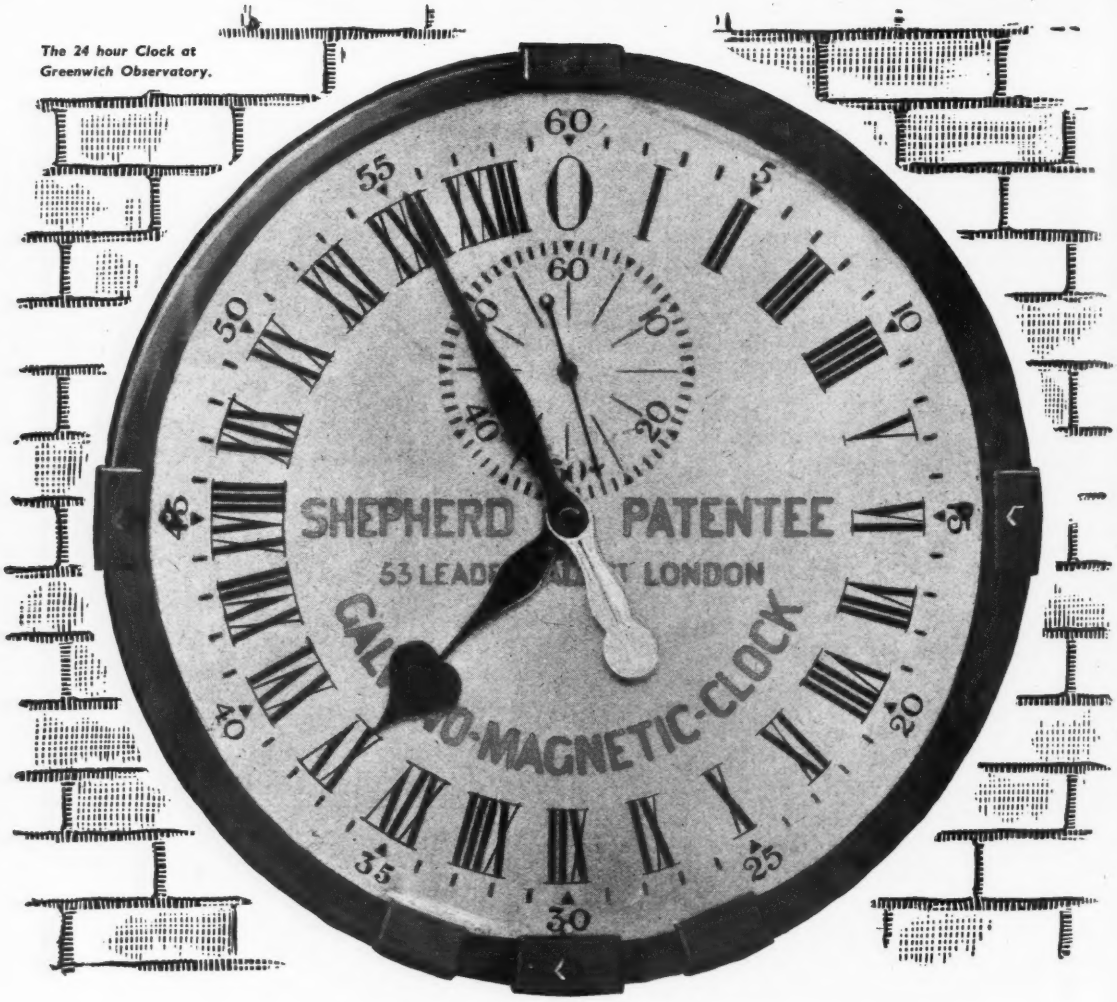
** These are based on a 400/230v. output setting : other voltages available.*

Claude Lyons Ltd.

STABILISER DIVISION

VALLEY WORKS · HODDESDON · HERTS · TELEPHONE: HODDESDON 3007 (4 LINES)

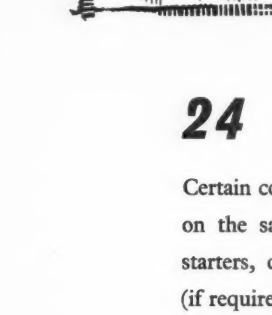
CL36



The 24 hour Clock at Greenwich Observatory.

24 HOUR DESPATCH SERVICE

Certain commonly-used Brookhirst motor control equipment can now be despatched on the same day as orders are received. For example, A.C. automatic straight-on starters, comprising 'block' contactor, thermal overload/single phase relay, and (if required) isolator, are available in various horsepowers up to 5 h.p. at 400/440 v. 3 phase 50 cycles. A wide range of push buttons, control switches, limit switches and main current switches is also offered. Details of this special service are given in the current Brookhirst Short Delivery List—may we send you a copy?

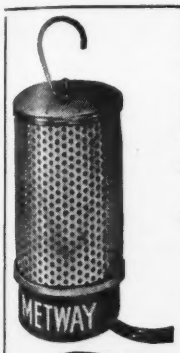


BROOKHIRST

STANDARD STARTERS & ACCESSORIES

BROOKHIRST SWITCHGEAR LIMITED, NORTHGATE WORKS, CHESTER

A METAL INDUSTRIES GROUP COMPANY CVS-55



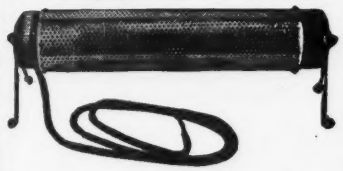
3 NEW LINES by METWAY PRODUCTS

"FROSTAWAY" HEATERS

The little heater with 101 uses:
Car radiators, water tanks and pipes, greenhouses, kennels, chicken houses, etc.
Available in 25 watt, 60 watt, 100 watt
List No. DA/11
ALL 11/- EACH
(plus 4/9 P.T.)

"SUPERWAY" BOWL FIRE

Polished aluminium reflector
Cast silver base
3 core flex
List No. DA/150
ONLY 18/6 RETAIL
(plus 6/6 P.T.)



METWAY "WARMWAY" HEATER

For Airing Cupboards, etc.

List No.	Watts	Price	P.T.
DA1911	250	19/11	8/7
DA1911/A	500	25/-	10/10

For full details of these and our other new appliances ask for Catalogue No. DAR/8 ER

METWAY · KEMP TOWN · BRIGHTON · ENGLAND

STEEL SHELVING

72" HIGH
34" WIDE
12" DEEP

- *Brand new—Manufactured in our own works*
- *Shelves adjustable every inch*
- *Heavy gauge shelves will carry 400 lbs. each*
- *Stove enamelled bronze green*
- *6 shelves per bay—Extra shelves 8/- each*
- *Quantity discounts*

DELIVERED FREE
£3.15.0
Ready for Erection

N. C. BROWN LTD.

Rochdale Road Works
HEYWOOD · LANCS
—the manufacturers!

This shelving is available in WHITE enamel at extra cost.

ALL OTHER SIZES available at equally keen prices.

Telephone:
Heywood 69018
(3 lines)

Winter

plays havoc with electrical installations

—so test NOW with a

MEGGER
TRADE MARK

Insulation Tester and insure against breakdown

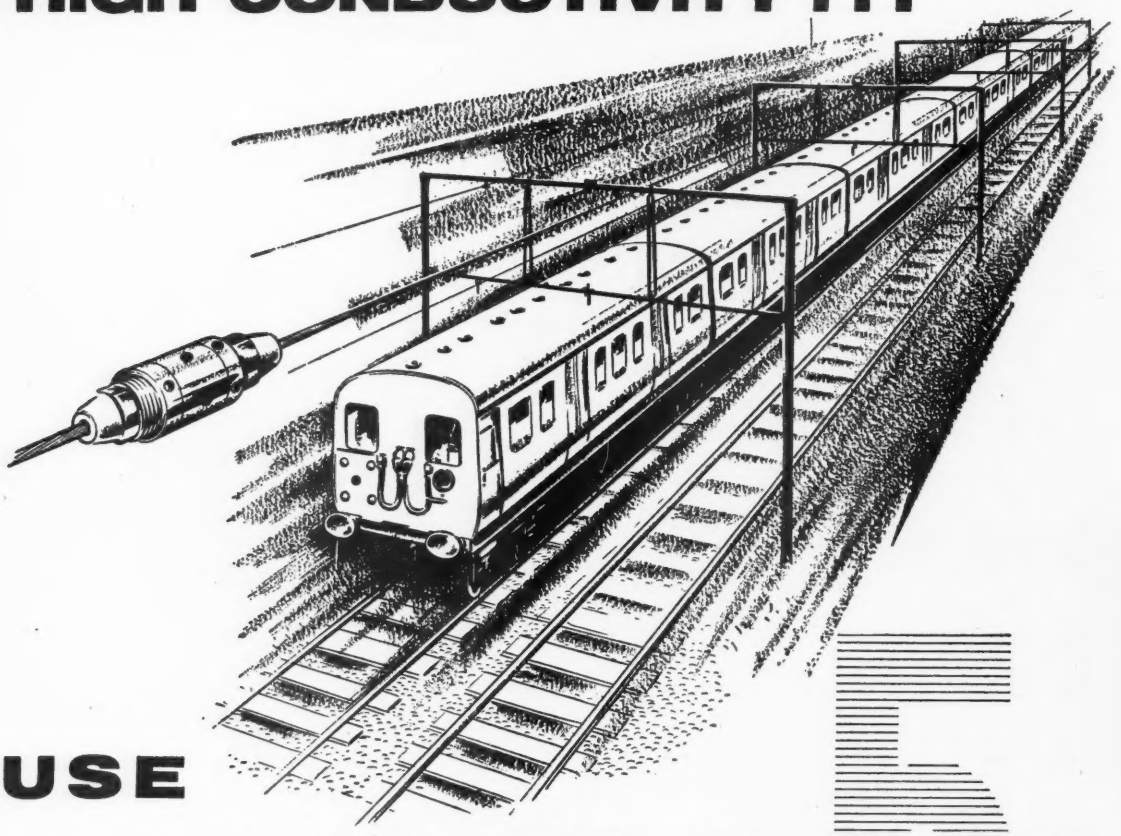
Please write for publications

EJ 291.....Insulation Tester Series 1
EJ 317.....Insulation Tester Series 2
EJ 200.....Insulation Tester Series 3
EJ 238.....Insulation Tester Series 4

INSTRUMENTS DIVISION
EVERSHED & VIGNOLES LIMITED
CHISWICK · LONDON W.4
Telephone: Chiswick 3670
Telegrams and Cables: MEGGER, LONDON, TELEX

EVERSHED SERVES INDUSTRY
7/56

For MAXIMUM STRENGTH with HIGH CONDUCTIVITY . . .



USE LANGLEY HIDUREL 5

The HIDUREL range of high strength, high conductivity alloys is helping to solve many modern electrical engineering problems at the design stage, especially where, in addition to strength and conductivity, a high resistance to corrosion is required.

The illustration shows a cable splice in use on the British Railways Eastern Region extension. All the components on this splice are turned from HIDUREL 5 ROLLED BAR. Cable and splices must be completely reliable in service. Breakdown due to mechanical failure or fatigue cannot be tolerated and a good resistance to atmospheric corrosion, which can be especially severe in tunnels, is essential.

British Insulated Callender's Cables specify HIDUREL 5 for these exacting duties after considerable research and test investigation on many types of materials. HIDUREL 5 BAR is available from stock. The material can also be supplied as stampings, forgings, sand and shell moulded castings.

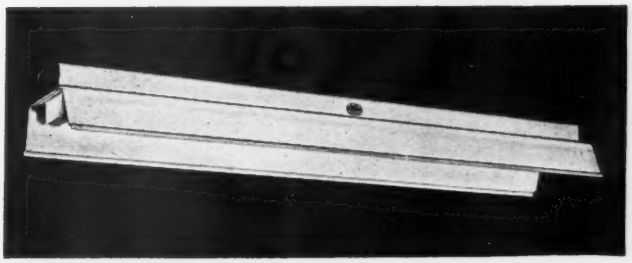
LANGLEY ALLOYS LIMITED
LANGLEY • SLOUGH • BUCKS
Telephone: Langley 432 (10 lines) · Telegrams & Cables: LANGALLOY TELEX SLOUGH

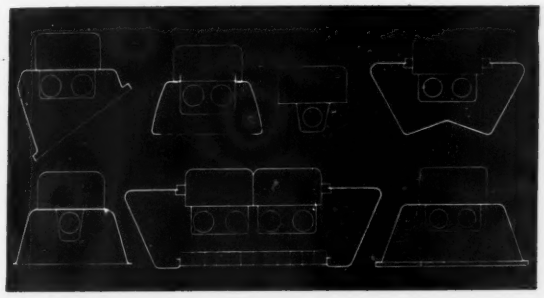
LANGLEY Special ALLOYS

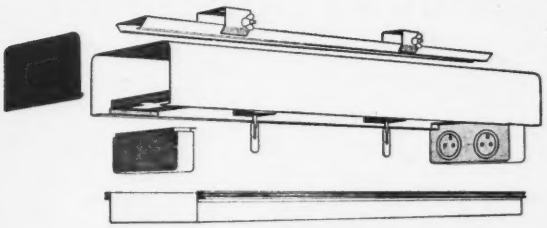
LA59

A FAMILY OF 366 FLUORESCENT FITTINGS

The Atlas Atlantic range provides an unfettered choice of fluorescent lighting fittings for all lighting applications—industrial, commercial or general purpose. The choice runs to type of fitting, length, number of tubes, gear, suspension, etc., yet the entire range stems from one basic chassis and a few simple attachments. This degree of standardisation, coupled with unique design features, greatly simplifies installation —particularly in coping with changes in large installations. Maintenance is easy, efficiency and quality are of a very high order and prices competitive.







Features of the Atlas Atlantic chassis include:
8ft., 5ft., 4ft. or 2ft. sizes. Single, twin or multiple tubes; bi-pin spring loaded lampholders; enclosed switch- or quick-start gear, easily detachable reflectors or diffusers; fixed or adjustable suspension.

atlas atlantic

Top right. The range includes Industrial fittings with single piece open-ended slotted metal reflectors (series 10), closed end, slotted reflectors (series 103), open or closed end unslotted reflectors (series 19/193) and metal louvre attachments (series 10L and 19L). All metal work is stove enamelled white, with black ends to chassis.

Bottom right. A wide choice of decorative fittings for commercial applications is available. Series 15 (illustrated) have louvred plastic diffusers that snap into foam plastic filled channels; and are white stove enamelled with black end plates.

ATLAS leads in Lighting

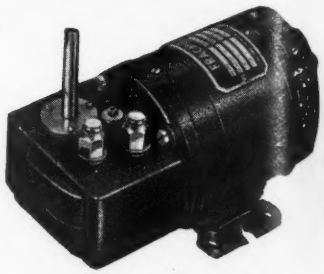
ATLAS LIGHTING LIMITED *A subsidiary company of Thorn Electrical Industries Limited* 233 SHAFTESBURY AVENUE LONDON WC2

small wonder . . .

The very wide range includes :

- ★ UNIVERSAL 1/250 to ¼ h.p.
- ★ SINGLE, SPLIT PHASE 1/100 to ¼ h.p. and CAPACITOR 1/80 to 1/6 h.p.
- ★ 3-PHASE 1/20 to 1/3 h.p.
- ★ SYNCHRONOUS 1/100 to 1/16 h.p.
- ★ SHADED POLE 1/60 h.p. at 1,300 r.p.m.
- ★ GEARED UNITS 0.125 to 600 r.p.m. Torque up to 850 lbs/ins.

Our vast resources and many years of wide and practical experience are available to you. Consult us first — and be sure of success!



● Illus.: Type 334C40 Geared Motor, with A.C. and D.C. interchangeable frames 1-20 r.p.m. Torque: 20-10 lbs/ins.

FRACMO does a big job!

FRACTIONAL H.P. MOTORS LTD

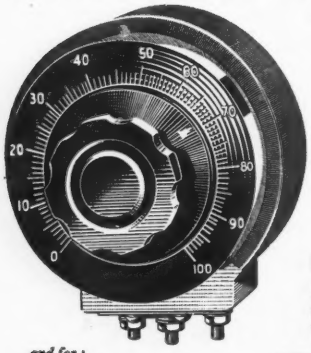
Rookery Way • Hendon • NW9 • Phone: COLindale 8022/4

Also 6 Lansdowne Road, Erdington, Birmingham 24 Phone: Erdington 4600

BAF 314

Consult Birch for TOROIDAL RESISTORS

REGISTERED TRADE MARK



FORMER : Patented ceramic moulding with horizontally opposed copper graphite internal brush movement.

WINDING : Best quality resistance wires to B.S.S. 115.

Write for list No. 130

VITREOUS ENAMELLED RESISTORS

Ferrule or wire end type : full range of 24 sizes — 1½ — 250 watts. List VE. 190.

and for :
Asbestos Woven Mats
Heating Elements
Loading Resistors
Motor Operated Resistors
Stud Type Resistors
Sliding Resistors

Birch

REGISTERED TRADE MARK

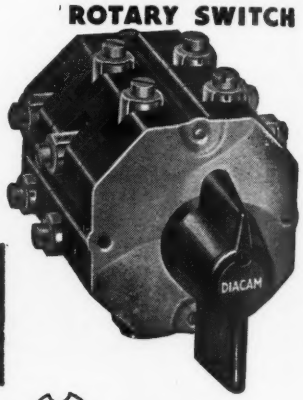
H. A. BIRCH & CO. LTD.

WOOD STREET, WILLENHALL, STAFFORDSHIRE

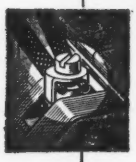
Telephone WILLENHALL 494 · 495 · Grams WILOHM WILLENHALL
LONDON OFFICE : 1-5 NORTHOLT ROAD, HARROW, MIDDLESEX
Tel.: BYRON 5120

THE VERSATILE DIACAM ROTARY SWITCH

This 30-amp. rotary switch has solid silver contacts and a double-break on each pole, ensuring maximum efficiency and absolute safety under allconditions. Available in most sequences for either single or multi-pole switching.



This shows the patent terminal clamp securing two conductors

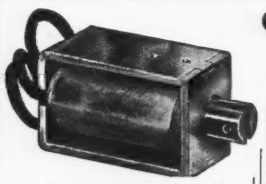


MOTOR
FAN
No3

The specially engraved identity discs, also panel mounting indicator plates, can be supplied to customers' requirements

CRAIG & DERRICOTT LTD.

ROYAL WORKS, SUTTON COLDFIELD. Tel.: Sutton Coldfield 2547



PHIL-TROL SOLENOIDS

QUICK DELIVERY

Solenoids are normally despatched same day as receipt of order.

Range covers types 41 and 42 (front 1" × 1¼") 38, 39 and 40 (front 1¼" × 1¾") and power A.C. and D.C. sizes up to 60 inch-lbs.

6 v-460 v A.C. and D.C. types

PHILLIPS CONTROL (G.B.), LTD.

Farnborough, HANTS. *Telephone: Farnborough 1120*

FOR ANYTHING IN **MICA** — Natural in all Grades and Qualities, Stove Micas, Plates, Washers, Commutator Segments, Condenser Films, etc.

MICANITE — Moulding, Commutator, Flexible, Heat-resisting Qualities, Commutator Rings, Spools, Tubes, etc.

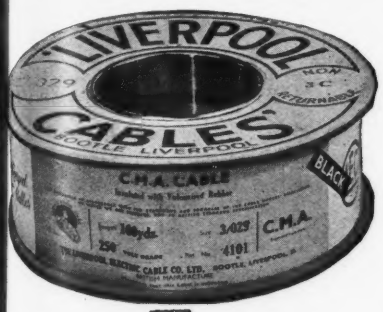
BAKELITE — Mouldings of any shape or form, Tubes, Plates, Washers, Sheets in all thicknesses, etc.

Send to the Manufacturers :

THE BIRMINGHAM MICA CO. LTD.

South Road • Hockley • Birmingham

Phone: Northern 5631/2 Telegrams: "Insulation, Phone, Birmingham"



LIVERPOOL CABLE

carries the

C·M·A

label

Certification Mark

THE LIVERPOOL ELECTRIC CABLE COMPANY LTD

LINACRE LANE · BOOTLE · LIVERPOOL 20

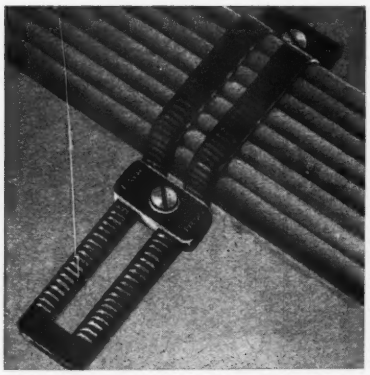
BARE AND INSULATED ELECTRICAL CONDUCTORS OF ALL TYPES

THE LONDON ELECTRIC WIRE COMPANY AND SMITHS LIMITED	FREDERICK SMITH & CO.	THE LIVERPOOL ELECTRIC CABLE CO. LTD.	VACTITE WIRE CO. LTD.

Announcing Insuloid adjustable saddles

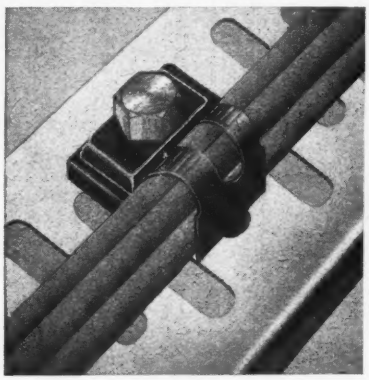
the NEW way to cut wiring costs & increase efficiency

Another Insuloid contribution to cable fixing efficiency, the AS *two screw* fix saddles and the SAS *single screw* fix saddles fulfil every requirement for cable security, time saving in assembly and reduction in installation costs wherever electrical wiring is required. Insuloid Adjustable Saddles bring a new versatility to cable fixing and will accommodate cables of any diameter, any type and in every combination for both direct-to-wall fixing and in conjunction with standard slotted cable racking. The saddles are made in the highest grade of nylon to combine immense strength, high insulation value, free from corrosion and electrolytic action. The Insuloid saddles are so tough as to be virtually unbreakable and will withstand the effects of a wide range of chemical and acid attack.



Type AS adjustable saddle

The quickest, most convenient, most versatile and economical cable security installation method yet known. The Insuloid AS Adjustable Saddles accommodate cables of any diameter, every type and every combination, to provide complete security for even the most complex wiring assembly, and at the same time reduce time and costs. The saddles are made in the highest grade nylon for immense strength high insulation and anti-corrosion and electrolytic action.



Type SAS single screw fixing adjustable saddle

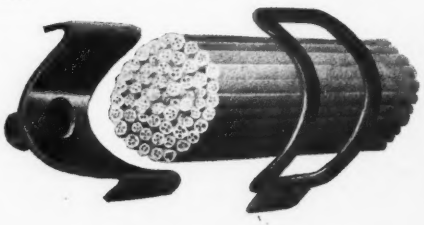
A development from the AS Saddles, here is another Insuloid quick-fix, efficient time-saving system. Designed with a slotted boss for engaging in slots in standard cable racking. Extremely economical and approved in service.

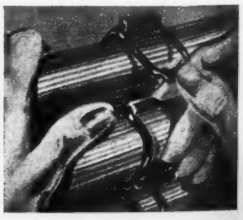
Look at these advantages

Lighter and stronger than metal
Absolutely anti-corrosive
Self-tensioning straps
Considerably reduced time and labour costs
Brings greater versatility to wiring systems
Minimises carrying large stocks of components

and the revolutionary CRADLECLIP system

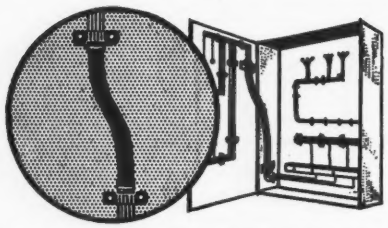
Saves up to 50 per cent in wiring time. Absolutely foolproof in application. Completely safe and permanent in operation. The system consists of Binders and Endless Extensible Clips for unsupported wiring and Cradles and Endless Extensible Clips for anchored wiring. Binders and Cradles are moulded from tough Nylon and are virtually unbreakable. Endless Extensible Clips are moulded P.V.C., combining the right degree of toughness with the necessary flexibility to hold any type of cables securely and without damage. Temperature range approximately −60°C. to +100°C.



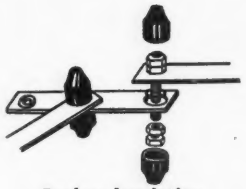


1 . . 2 . . and it's fixed!

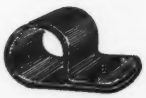
Find out about these other Insuloid products



Flexiguard Cable Trunking
Developed for cubicle-to-door wiring protection and speed of installation. Simple to fix and an obvious aid to wiring problems.



Busbar Insulation
Shrunk-on hard plastic sleeving brings immediate savings in cost, time and production with increased efficiency and safety. Provides permanent dielectric non-ageing and "non-tracking" protection.



NX, CY and X Clips
The well-known Insuloid range of cable clips in nylon and P.V.C. For long service, anti-corrosive, non-chafing and very economical.

Ring Lock Bush
A snap action, quick-locking bush that will not come out after fixing. Simple finger action, instantaneous assembly for complete security in service. Non-metallic, high dielectric, fully tropical, approved all services.

Literature available now.

Insuloid products for greater cable fixing efficiency

INSULOID MANUFACTURING CO. LTD.

SHARSTON WORKS, LEASTONE ROAD, WYTHENSHAWE, MANCHESTER. Telephone: WYTHENSHAWE 2842 & 3163

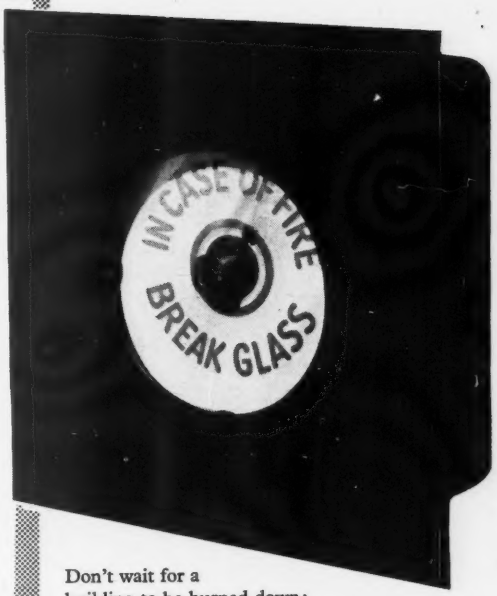
TO BE FIREWARNED IS TO BE FIREARMED!

Prompt warning of fire can save valuable life and property.

The "STERDY" FIRE ALARM SYSTEM makes effective provision for giving that warning, so allowing quick evacuation of a building and prompt tackling of the fire.

The alarm may be by bell, buzzer or klaxon, or the system may be used in conjunction with a "STERDY" Luminous Indicator installed in the room of a porter or caretaker.

- ★ Flush mounting
- ★ Strong, non-corroding face-plate
- ★ Simple, reliable mechanism
- ★ Testing hole in glass
- ★ Suitable for all large buildings



Don't wait for a building to be burned down; be "firewarned" and install a **"STERDY" ALARM SYSTEM** as it is going up!

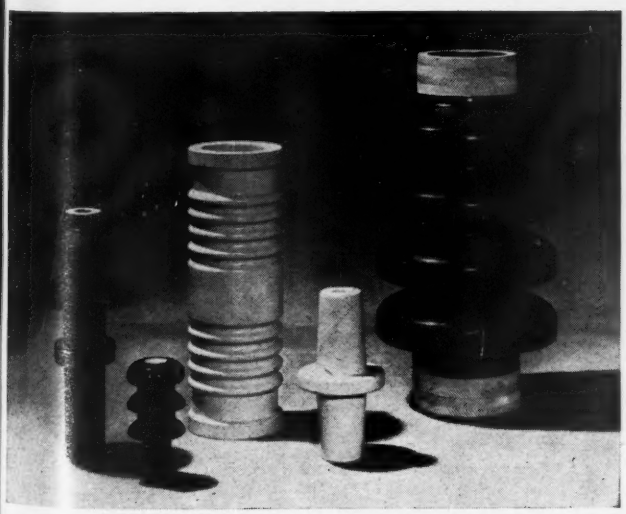
EST. STERDY 1920 TRADE MARK

W. C. DAVEY & CO.

180-2 TOTTENHAM COURT ROAD, LONDON, W.1 TEL.: MUSEUM 4414, 4415 & 6388

J. MACINTYRE & CO. LTD.

Manufacturers of
PORCELAIN INSULATORS



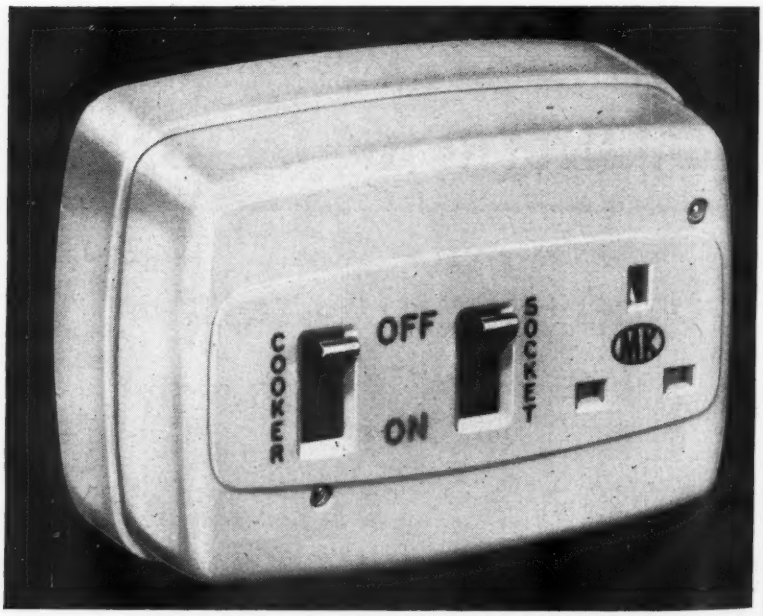
Insulators for
HIGH TENSION
LOW TENSION
REFRACTORIES
and Special Ceramics

Waterloo Road
Burslem
Telephone : Stoke-on-Trent 87938

MK140DHB

A NEW all-insulated COOKER CONTROL UNIT

FOR SURFACE INSTALLATIONS this new all-insulated cooker control unit is extremely neat and compact. It has a tough, easy-to-clean case moulded in ivory of urea formaldehyde, and the switch handles are red in contrast. A self-contained mounting block is provided so that the unit can be fixed direct to the wall, and the cables are housed in an incombustible compartment with good entry facilities. The unit is designed for straight-through wiring and earthing. Maximum dimensions across the base are $5\frac{7}{8}''$ x $4\frac{1}{4}''$.



List No. 5040/646 *30 amp double pole AC surface cooker control unit with 13 amp double pole switchsocket-outlet, all-insulated pattern, ivory finish. Complete with ivory 13 amp fused plug,* **28/8** *each*

Also available with twin neon pilot-lights, **List No. 5041/646.** *Complete with two lamps and ivory 13 amp fused-plug,* **38/-** *each*

MK ...the mark of leadership

M. K. Electric Limited, Wakefield Street, London N.18 *Edmonton 5151*

27 SEPTEMBER
1957

ELECTRICAL REVIEW

Managing Editor: HUGH S. POCOCK, M.I.E.E. *General Editor:* J. H. COSENS *Technical Editor:* P. W. TUCKER, M.I.E.E.

In This Issue

Electricity Supply in 1956-57	539	Central Electricity Authority's report
Tariff Implications	547	Factors to be taken into account in the framing of two-part tariffs
Printing Works Change-over	550	Conversion to public supply and installation of improved lighting system at The Chapel River Press
Public Lighting Engineers' Conference	553	Report of discussions at Torquay
Electrical Methods of Green Crop Drying	559	An attractive load for supply authorities
Railway Contracts	560	Report of inquiry into purchasing procedure
Domestic Electrical Equipment—Food Mixers	574	Details of the range of models now available

✧ ✧ ✧ ✧

Machines and Ventilation	552	**In the Courts**	575
Letters to the Editor	556	**Financial Section**	578
Views on the News	563	**Generation and Development**	581
I.E.E. Centre Chairmen	564	**New Patents**	582
Personal and Social	565	**Next Week's Events**	583
Industrial News	568	**Contract Information**	584
New Electrical Equipment	571		
Electrical Research	573	*CLASSIFIED ADVERTISEMENTS*	101
Electrical Trade of Austria	574	*INDEX TO ADVERTISERS*	112

VOLUME 161 NUMBER 13 ✧ *Eighty-Fifth Year of Publication* ✧ FRIDAY PRICE 1s 6d

Editorial, Advertising and Publishing Offices: Dorset House, Stamford Street, London, S.E.1. Telegraphic Address: "Elecrev, Sedist, London." Code: ABC. Telephone No. Waterloo 3333 (60 lines). Registered at the General Post Office as a Newspaper. Entered as Second Class Matter at the New York, U.S.A., Post Office. Annual Subscription: Home and Overseas £4 10s 0d: U.S.A. and Canada $14.00. Cheques and Postal Orders (on Chief Office, London) payable to ELECTRICAL REVIEW PUBLICATIONS LTD. and crossed "Lloyds Bank."

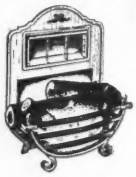
Just as warm as they look —

Berry's MAGICOAL electric fires

Minorberry

Berrylog A.21/0

Masterberry 444/L


Alderberry

Dukesberry

Magicoal Fires and Radiators — Popular Models

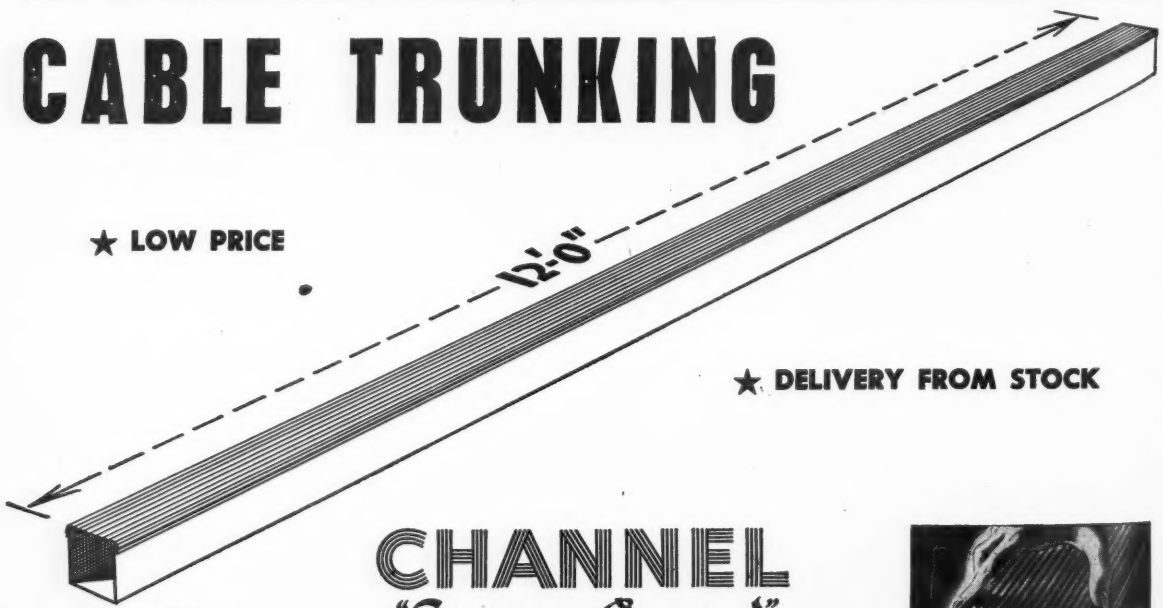
Cat. No.	Model	Loading	List Price	Purchase Tax	Tax Paid Price
457	ADJUSTABERRY (Coal or Log)	2½kW	12 10 6	5 9 11	18 0 5
110	ALDERBERRY	2kW	20 13 6	9 1 5	29 14 11
A.21/0	BERRYLOG	1½kW	10 12 6	4 13 3	15 5 9
A.21/S	BERRYLOG	1½kW	9 18 6	4 7 1	14 5 7
452	DUKESBERRY	2kW	12 9 6	5 9 6	17 19 0
108	EMBERBERRY	2kW	16 10 6	7 5 0	23 15 6
109	EMBERBERRY with dogs	2kW	19 15 0	8 13 4	28 8 4
442	HOMEBERRY	2kW	9 18 6	4 7 1	14 5 7
444	MASTERBERRY (Coal or Log)	2kW	15 17 6	6 19 3	22 16 9
555	MASTERBERRY (Coal or Log)	3kW	16 5 0	7 2 7	23 7 7
333	MASTERGLOW	2kW	12 10 0	5 9 8	17 19 8
441	MAYBERRY	2kW	13 3 6	5 15 7	18 19 1
468	MINORBERRY	2kW	7 19 6	3 10 0	11 9 6
890/1	RAYDAIR Variable Thermostat	1kW	9 9 0	4 2 9	13 11 9
890/1½	RAYDAIR	1½kW	13 15 6	6 0 11	19 16 5
890/2	RAYDAIR	2kW	21 5 0	9 6 6	30 11 6
628	VANGUARD (Standard)	2kW	5 19 6	2 12 5	8 11 11
406	WOODBERRY	3kW	16 14 0	7 6 7	24 0 7

This page shows the complete range of popular Berry's Models.
For Period and special fires please write for detailed information.

BERRY'S ELECTRIC MAGICOAL LTD., *Touchbutton House, Newman Street, London W.1. (MUSeum 6800)*

CABLE TRUNKING

★ LOW PRICE



★ DELIVERY FROM STOCK

WRITE FOR BROCHURE No. R.A.112

CHANNEL "Spring Capped" CONDUIT

CHANNEL CONDUITS LTD., 11 VICTORIA STREET, LONDON, S.W.1. Telephone: ABBEY 2027/8

ELECTRICAL REVIEW

27 September 1957 Vol. 161 No. 13 Established 1872

Progress Continues

SPECIAL significance attaches to the 1956–57 report of the Central Electricity Authority: it covers the last full year of the Authority, which ceases to exist on 31st December. It is not yet the time to write the Authority's epitaph, but this report will provide very favourable material for one.

In their nine years the Authority and Area Boards have increased the sales of electricity by 107 per cent and, particularly, the sales to farms (though still a small proportion of the total) have risen by 411 per cent. This may have been due largely to the natural trend, but the increase has been achieved with a rise in price of only 28·4 per cent in a period in which the cost of practically everything else has gone up by 50 per cent or more, including most of the materials used by the industry itself. As a measure of the industry's improved productivity the C.E.A. claims that the number of employees per megawatt of output capacity has fallen by 35·5 per cent since 1947–48.

The aggregate net surplus of £11·7 million shown in the accounts of the Authority and Area Boards (although three Boards incurred deficits) is above the previous average but still only 3 per cent on the combined revenues and about 0·5 per cent on the capital invested in fixed assets. The accountancy school which favours replacement cost as the basis of depreciation may question the actuality of the surplus and so it should be mentioned that there now exist supplementary depreciation reserves of £33·25 million.

Restrictions on expenditure and on hire-purchase retarded the rate of domestic expansion and the improvement which set in towards the close of the year is unlikely to continue under the measures now being instituted for the protection of the pound. By the same token, the provision of generating plant may be affected, although the unwisdom of cutting down in this direction has been amply demonstrated in the past.

There have been notable engineering developments during the period under review, many of which are pointers to even greater achievements in the years to come. Outstanding among these has been the use of the grid for the first time to transmit electricity generated in a full-scale atomic power station (Calder Hall) and the putting in hand by the C.E.A. of two larger stations (and more recently of a third) of the same kind. Evidence that the day of coal-fired stations is by no means over was provided, however, by the start of work on a site at High Marnham for a 1,000 MW station (the largest project in Europe) which will contain 200 MW sets, and the order placed for a 550 MW set for another installation elsewhere.

The yearly improvement in the average overall thermal efficiency of generation has continued, although still retarded by the need to keep in operation obsolescent plant.

In this advance the effect of the commissioning of new plant, returning efficiencies of round about 30 per cent, is clearly discernible. High voltage interconnection has been extended into a new field and on a different system by plans for laying a cross-Channel 200 kV d.c. cable as a link with the French transmission system.

Those critics who are prone to dismiss all national industries as stale, flat and unprofitable should at least except the electricity supply industry from their strictures.

RESTRICTIONS ON INVESTMENT

What the effects of the rise in the Bank Rate to 7 per cent and restrictions on capital investment will mean to the electricity supply and electrical manufacturing industries is not yet predictable. But whatever their extent or intensity they will be adverse. So far as electricity supply is concerned it has been decided that the current year's capital expenditure shall not exceed that of last year; a substantial increase had been planned. Cuts made now will have serious effects in five or six years' time and it is to be hoped that the country's future welfare (so dependent upon an adequate supply of power) will not be jeopardised by a lack of discrimination between essential and non-essential expenditure.

Another largely-electrical undertaking which is likely to be badly affected by capital restrictions is the railway modernisation plan. Here again delay will be extremely detrimental to the country's future and there are many less important projects which could be deferred.

As the leading exporter, the electrical manufacturing industry should also receive more favourable consideration in the allocation of capital than some less vital industries, although it will, in common with others, have to pay more for it.

ATOMIC ENGINEERING

Great as is the debt owed to British scientists for making available vast quantities of heat from fission of the nucleus of the atom, it is to engineers that the credit belongs for the immediate application of this heat to the production of electricity. This point was made last week by Mr. H. G. Nelson (managing director, English Electric Co.), who emphasised that the design and construction of an atomic power station is the application of established engineering principles and techniques to novel situations and so rapid has been progress in this way, Mr. Nelson further stated, that the estimated generating cost at Hinkley Point atomic power station (described in our last issue), involving a capital expenditure of £60 million, is within the present United Kingdom average figure of 0·65d/kWh.

SPECIALISED LIGHTING

At this time of the year we always hear a great deal about specialised lighting in one form or another, particularly from speakers at the annual conference of the Association of Public Lighting Engineers. This usually relates to some broad division such as utility or decorative lighting. In the paper dealing with the lighting of bridges and tunnels presented last week at the A.P.L.E. Conference, Messrs. Smith and Waldram talk of the technical and æsthetic aspects of the lighting of a bridge. This emphasises the fact that no matter what is to be lighted both the utility and æsthetic angles come in.

It is said that the lighting of bridges and tunnels for vehicular traffic presents almost exactly opposite problems because a bridge has no background while in a tunnel the background predominates. Again the paper stresses the necessity, in the case of a bridge, to light objects strongly from the side and the authors point out that the lighting should mainly be directed across rather than along the bridge, with units at a spacing which is very short when measured by conventional standards.

This is but one example of the enormous number of lighting applications, each of which requires special treatment from either the utility or decorative angles, or both.

A "PSYCHOLOGICAL" PROBLEM

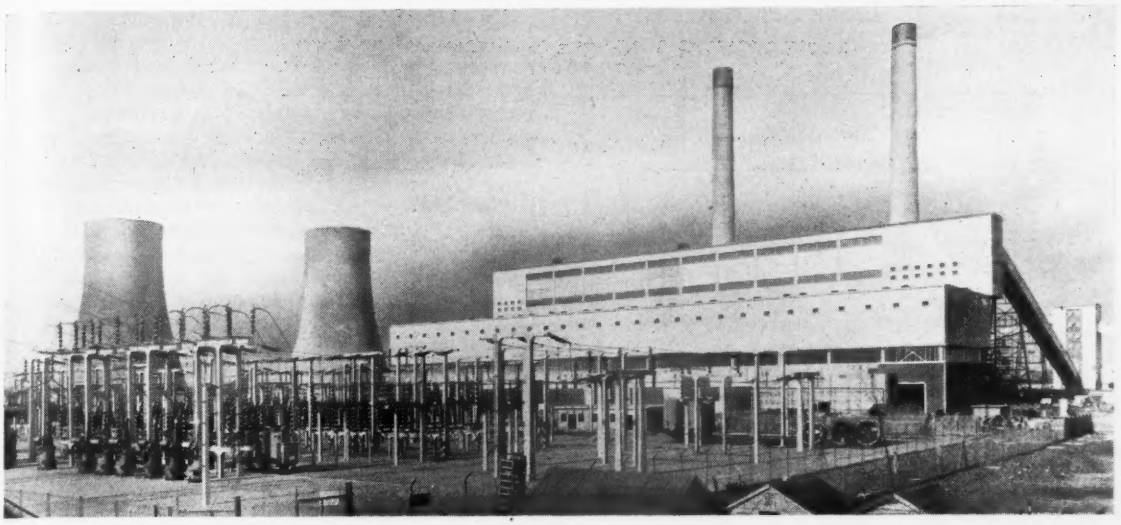
Before the set-back caused by the war in the field of electric heating we had reached a stage, particularly in the domestic field, where experts talked a great deal about "psychological" heating. It usually arose out of discussions on imitation fuel fires where some small degree of effective lighting was introduced to give the impression of heat. Some even went so far as to install lighting units only in the hearth or places normally occupied by heating apparatus.

This gave rise to some controversy as to whether "psychological" treatment was really a heating problem or a lighting problem. We are inclined to support the majority opinion of that time that it is really a lighting problem, but whatever is the correct answer we do feel that the lighting interests must be concerned and that the development should be followed up as a matter of specialised decorative lighting.

RAILWAY ELECTRIFICATION CONTRACTS

Serious criticism of the British Transport Commission's procedure in placing contracts for supplies and works was made by Mr. E. L. Gethin both during and after his tenure of the specially-created office of supplies and production adviser to the Commission. Questions in Parliament on the subject led the Minister of Transport to appoint Sir Harold Howitt, a distinguished accountant, to inquire into Mr. Gethin's, and others', allegations.

Sir Harold Howitt's report, summarised on page 560 of this issue, shows that although many of the strictures were justified, in most instances there were extenuating circumstances. The principal criticisms related to the placing of contracts under British Railways' modernisation plan without competition. It was obviously the easiest course to award the contracts to known and tried firms and especially under the compulsion of construction within a limited period and insufficient technical staff. Nevertheless the Commission is anxious to have competition; it insists that it is not giving the successful contractors a monopoly of future contracts, though naturally they are placed in a strong position. On the whole, it is suggested that costs have not been unduly increased by the Commission's procedure because financial safeguards have been instituted.



Castle Donington power station at which the steam conditions are 1,500 p.s.i. and 1,050 deg F. The thermal efficiency (31·53 per cent) was the highest recorded for C.E.A. stations

Electricity Supply in 1956-57

REVIEW OF THE CENTRAL AUTHORITY'S REPORT

THE Ninth Report and Statement of Accounts of the Central Electricity Authority, which was published on Tuesday by H.M. Stationery Office, covers the twelve months ended on 31st March, 1957. Particulars given in Tables 1 and 2 show that the kWh generated at C.E.A. power stations in England and Wales, 79,525 million kWh, was 5·2 per cent more than in the previous year.

Steam power stations produced all but 0·3 per cent of the total kWh sent out. The improvement shown in thermal efficiency over 1955-56 was equivalent to a saving of more than one million tons of coal valued at £3·9 million and brought the amount of fuel saved in this way since 1947-48 up to 31·4 million tons worth £106 million. The average figure achieved by the twenty most efficient stations, which contributed about one-third of the national output, reached 29·14 per cent. The best individual figure was returned by Castle Donington (31·53 per cent), while Drakelow, Littlebrook "B," Portishead "B" and Stourport "B" (H.P.) all passed 30 per cent for a full year's running.

Of the 42·5 million tons of fuel burned, coal accounted for 41·4 million, of which 1·5 million tons was imported. Of the home production, 5·6 million tons was open cast; 20·7 million was transported by rail and 12 million by sea. The average pithead price of coal per ton was £3 18s, an increase of 8·5 per cent over the previous year.

The output capacity of new plant brought into commission, 1,828 MW, exceeded that for any previous year and was distributed among 33 power stations, including three new ones, namely; Castle Donington (1,500 lb/sq in and 1,050 deg F), Hams Hall "C" and Tilbury "A." Over 10,900 MW of new plant is scheduled for installation by the end of 1962. In the meantime 1,900 MW of obsolete plant is to be closed down, apart from that discarded in 1956-57, giving a net addition of 9,000 MW, which will include 1,275 MW of nuclear plant. Of the total capacity still in operation, 18·8 per cent of the generating sets and 15·5 per cent of the boilers were upwards of 25 years old. The average loss of maximum output capacity suffered last December and January was 10·5 per cent (compared with 8·5 per cent in the previous year) and was attributable to breakdowns 5·9, overhaul 2·6 and miscellaneous 2 per cent.

Last March the programme of nuclear power stations was stepped up from the 1,500 to 2,000 MW originally

TABLE 1. GENERATION STATISTICS: ALL C.E.A. STATIONS

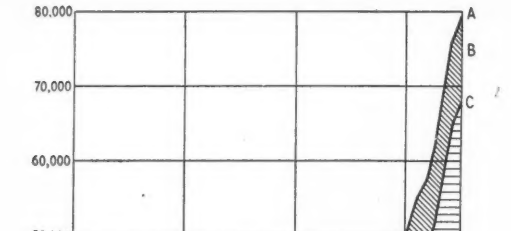
	1955-56	1956-57
Power stations in operation, number	274	262
Installed capacity, MW	20,644	22,572
Maximum output capacity, MW (a)	18,845	20,644
Electricity generated, million kWh	75,370	79,525
New power stations commissioned	7	3
Capacity of new plant, MW	1,632	1,928
Plant shut down, MW	134	103

(a) Installed capacity less that required for station auxiliaries and on account of technical limitations.

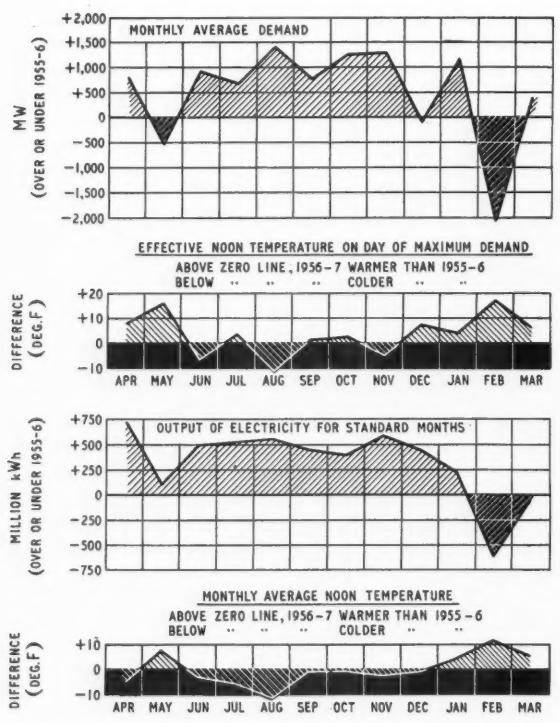
TABLE 2. STEAM POWER STATIONS ONLY

Technical Details	1955-56	1956-57
Power stations in operation, number	228	225
Maximum output capacity, MW	18,698	20,481
Electricity generated, million kWh	75,370	79,299
Electricity sent out, million kWh	70,710	74,378
Fuel burned, all types, million tons	40·82	42·54
Coal	39·72	41·44
Oil	0·21	0·27
Other types	0·89	0·83
Fuel, total, lb/kWh sent out	1·29	1·28
Coal, average calorific value, B.Th.U./lb	10,814	10,646
Coal, per cent pulverised	52·9	58·0
Heat rate, B.Th.U /kW sent out	14,013	13,688
Thermal efficiency per cent	24·35	24·93
Coal price (excl. handling) d/ton	862·7	936·4
Fuel handling d/ton*	44·2	45·7
Employees, number per MW of output capacity	1·96	1·86
Works Costs, pence/kWh		
Fuel, including transport	0·4982	0·5370
Fuel handling*	0·0255	0·0261
Operation salaries and wages	0·0373	0·0402
Oil, water and stores	0·0039	0·0039
Repairs and maintenance	0·0396	0·0421
Total works costs	0·6045	0·6493

* Includes pulverising, ash handling and disposal and flue gas treatment.



Growth of public supply in England and Wales. *(A) Electricity generated. (B) Used in power stations and in transmission and distribution. (C) Total kWh sold to consumers. (D) To industry. (E) To commercial premises. (F) Domestic consumers and farms. (G) Traction. (H) Public lighting*



Load and weather differences between 1955-56 and 1956-57. *The monthly maximum demand is the average, whether wholly supplied or not, on C.E.A. stations over the half-hour of highest demand in each month*

budgeted for to about 6,000 MW by 1965-66. At that time the total annual power station output is expected to reach 133,000 million kWh, of which 22 per cent will be generated in nuclear stations. Construction of the first two stations, of the natural-uranium gas-cooled graphite-moderated type, was started last January at Bradwell, Essex (300 MW, by the Nuclear Power Plant Co.) and at Berkeley, Glos (275 MW, by the A.E.I.-John Thompson Nuclear Energy Co.). Ministerial consent to the erection of a third station at Hinkley Point in Somerset was received in June, and this has since been put in hand (500 MW, English Electric, Babcock & Wilcox, Taylor Woodrow Group). Two sites in North Wales have been decided on.

At 75 per cent annual load factor overall costs of the earliest stations are expected to be somewhat higher than for modern conventional stations but directly competitive in subsequent designs. Nuclear generation will in the first instance be used principally to assist in supplying the growing needs of consumers in areas having insufficient locally produced coal, coal-fired stations being built near coalfields. Two-fifths of the total electrical demand in England and Wales lies south of a line from the Bristol Channel to the Wash, where nuclear generation will be prominent.

A 3,750 kW plant is to be in service by the end of next year in connection with the National Coal Board's underground coal gasification scheme at Newman Spinney (Derbyshire). Construction of the 300 MW pumped storage installation at Ffestiniog in North Wales was temporarily suspended owing to restrictions on capital expenditure; further schemes are under consideration.

Since the maximum weight transportable by road is 150 tons, 275 MW is probably the highest rating of a generator that will be practicable by 1962, so the 550 MW set ordered for the 1963 programme will have a two-line arrangement. Three-phase transformers of 310,000 kVA for a 27 MW set could be designed without serious technical difficulty, if it were not for the handicap of road transport. For 550 MW units multiple transformer installations will be necessary. Liquid-cooled stator windings have been adopted for the 200 MW machines at West Thurrock and Willington "B." A 30 MW generator, which has been brought into commission at Bold "A" (St. Helens) is believed to be the first in the world to use water for the direct cooling of stator conductors. The Willington "B" alternators and subsequent large machines for connection to the 275 kV grid will be designed for 0·85 power factor instead of the 0·9 provided for in the earlier 200 MW units.

Emission of hot gases at high velocities from a small number of tall chimneys of the height adopted for new power stations have been found to ensure satisfactory dispersal of gases into the upper atmosphere.

Details of the main transmission system are given in Table 3. Major works put in hand included 137 route miles of 275 kV lines and 252 miles of 132 kV lines; 60 miles of the latter consist of underground cables. Experimental series capacitors with protective devices are to be installed at different places. Shunt circuit-breakers for clearing transitory single-phase earth faults without opening circuits on load are also being provided.

Further designs of 275 kV and 132 kV air-blast circuit-breakers have been approved for short-circuit ratings of 7,500 and 3,500 MVA. Of the 132 kV circuit-breakers in use, 64 per cent are of the bulk-oil type, 32 per cent are air-blast and 4 per cent of the small-oil-volume design. Over two-fifths of the 275 kV breakers are bulk oil, the remainder being air-blast.

Thirty-two transformers for the supergrid are now on site; these include two 120 kVA, 275/66 kV double-wound units. Further orders were placed for 132 kV transmission transformers with cores of cold-rolled grain-oriented steel having a flux density of 15,500 lines/sq cm, but the amount of this steel available is limited. For railway electrification at 25 kV single-phase transformers have been ordered for connection between phases of the 132 kV system.

The first order was placed for a 275 kV cable; this is a short run of a gas-filled type for a power station transformer circuit. Two gas-pressure and two oil-filled designs, each with a straight joint, are still connected in circuits at the Staythorpe testing station under service conditions. A number of major 132 kV installations including three-core cables of both types, up to nearly three miles long, are operating at a maximum stress of 100 kV/cm.

There were 477 primary faults on the grid during the year and 89·3 per cent were correctly cleared. An account is given of the numerous research activities of the Authority and reference is made to the d.c. cross-Channel link with France, as described in the *Electrical Review* of 13th September.

Mainly because of the mild winter the year's maximum demand (17,668 MW on 15th January last) was met by the available generating plant without reduction of voltage or frequency, or load shedding. The maximum demand compared with one of 16,703 MW and a maximum potential demand of 18,100 MW recorded in 1955-56.

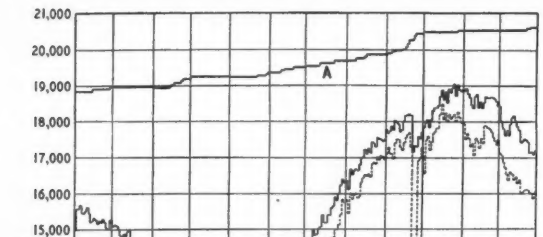
TABLE 3. MAIN TRANSMISSION SYSTEM

In commission at 31st March	1956	1957
Overhead lines, route miles (total)	4,882	5,051
275 kV	464	557
132 kV	4,285	4,403
66 kV and below	133	91
Underground cables, route miles (total)	439	697
275 kV	—	—
132 kV	69	91
66 kV and below	370	359
Substations, number	257	362
Transformer capacity, MVA (total)	24,020	28,680
275 kV	840	2,880
132 kV	20,977	23,447
66 kV and below	2,203	2,353

During 1956-57 74,597 million kWh was sent out from the Authority's power stations and 91 million kWh was purchased from outside. Of the 74,688 million kWh thus available the Area Boards purchased 70,233 million; the balance was accounted for as follows:—Used in the main transmission system 1,771 million, sold to the South of Scotland Electricity Board 480 million (net) and sold direct to consumers 2,204 million. In 1955-56 a total of 70,894 million kWh was sent out and 109 million kWh was purchased. The Area Boards took 67,145 million kWh and the South of Scotland Electricity Board 444 million (net).

Total sales to consumers by the Authority and Area Boards amounted to 67,514 million kWh, an increase of 6·7 per cent over the 1955-56 total and 106·7 more than in 1947-48. Classified details are given in Table 4 which also shows that the number of consumers at 31st March

A recent photograph taken at the Berkeley (Glos.) atomic power station site showing progress on the erection of the reactors (left) and the turbine hall (right)



Plant capacity and system demand. *(A) Maximum output capacity with all plant in service. (B) Output capacity available after allowing for losses due to breakdown, overhaul and other generating plant limitations. (C) Output capacity as in (B) less capacity unused because of local circuit limitations within grid control areas. (D) Electricity purchased from the South of Scotland Electricity Board and other outside sources. (E) Electricity sold to the South of Scotland Board*

last was 14,536,368, an increase of 2·8 per cent over the previous year's figure.

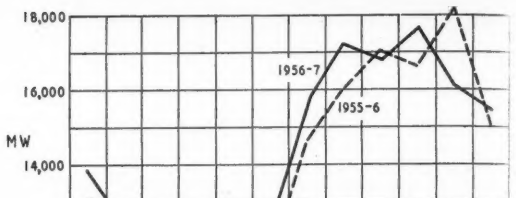
The report notes that the sales in 1956-57 were 267 per cent greater than in 1938. Average sales per domestic consumer rose from 1,190 kWh in 1947-48 to 1,613 kWh in 1956-57 and average sales per head of population from 780 to 1,529 kWh.

Referring to traction sales, the report states that when the British Railways' electrification plans are fully developed they will add about 300 MW to the demand on the public supply system, with a consumption of about 1,400 million kWh annually. Arrangements were made during the year for giving 25 kV single-phase supplies at Stockport, Crewe and Colchester, and for three-phase supplies (for conversion to d.c.) at five points for the East Kent scheme and an additional point for the Mersey and Wirral lines.

The new bulk supply tariff is commented upon in the report and a table shows that the Area Boards' load factors ranged from 38·6 per cent in the case of London to 59·3 per cent for South Wales, similar figures to those

TABLE 4. CONSUMERS AND SALES

Class	No. of Consumers 31.3.57	Per cent inc. or dec. on 1955-56	Sales of Electricity 1956-57 Million kWh	Per cent inc. or dec. on 1955-56
Domestic	12,780,257	+2·8	20,612	+9·1
Farm	188,059	+7·5	1,166	+18·1
Commercial ...	1,162,126	+2·0	8,406	+6·7
Combined domestic and commercial	228,853	−0·5	950	+5·6
Industrial	172,770	+0·9	34,287	+5·1
Public lighting ...	4,246	+1·5	588	+9·2
Traction—				
Railway	57	−12·3	1,161	+6·6
Street			344	−5·2
All classes	14,536,368	+2·8	67,514	+6·7



Monthly maximum potential demand (half-hourly) and (bottom) monthly output of C.E.A. power stations including allowance for low frequency, voltage reduction or disconnection of supply

shown in the last report. The effective running charge ranged from 0·5702d/kWh (Yorkshire) to 0·7784d (London).

The main task of domestic tariff standardisation on an Area basis was completed by the introduction of a standard two-part tariff by the London Board. Further progress was made with the other main classes of consumer. The Retail Tariffs Committee completed the review of its original recommendations and its report substantially endorses the principles outlined in its 1951-52 report (para. 209) which have been largely followed by the Boards; but it deals in more detail with the relation of consumer load characteristics to price. A "standstill" of prices to consumers observed during the year has had to be abandoned because of coal price increases.

The number of farms connected during the year (13,135) was less than in the two preceding years (13,840 and 14,666), but the average consumption per farm was 6,201 kWh compared with 5,722 kWh in 1955-56—a record increase. Of the estimated number of farms (273,877), 188,059, or 68·7 per cent, had been connected by 31st March last. Although the rate of expansion was slowed down by restrictions on capital expenditure it is still hoped to reach a figure of 85 per cent by 1963.

It has been decided that, except in abnormal cases, the Boards will not seek a contribution towards the capital cost of taking a supply to a housing estate (other than the cost of service lines and connections) if the housing authority provides a specified minimum standard of wiring and give tenants freedom of choice of appliances.

Progress was made in changing over non-standard systems and at 31st March there remained 300,000 consumers on d.c. and 2,020,686 on non-standard a.c. supplies.

The Authority and Area Boards have continued to take an active part in the standardisation of appliances and accessories. Consideration was given, *inter alia*, to a draft B.S. code of practice on earthing.

Mention is made of the Clean Air Act, 1956, with particular reference to electric floor-warming and thermal storage block heaters. Representations have been made to the Government in an endeavour to make thermal storage block heaters available for domestic use.

TABLE 5. ANALYSIS OF AREA BOARDS' SALES

Board	Population at 30.6.56 (Thous.)	No. of consumers (nearest thous.)	Sales of Electricity (Thousands of kWh)							
			Domestic	Farm	Commercial	Industrial	Public Lighting	Traction	Total Sales	Inc. over 1955-56 per cent
London	5,015	1,732	2,579,960	529	1,911,824	1,670,000	107,906	45,271	6,315,490	5·2†
S. Eastern	3,368	1,162	2,042,324	79,325	646,105	1,233,486	43,450	18,428	4,063,118	9·1
Southern	3,931	1,264	2,036,262	164,435	654,038	1,995,263	38,327	20,519	5,023,495*	10·9
S. Western	2,147	718	1,009,197	85,591	501,943	896,246	23,131	—	2,516,108	7·1
Eastern	5,025	1,650	2,814,172	160,435	855,821	2,462,111	56,880	39,437	6,538,543*	7·6†
E. Midlands	3,784	1,244	1,627,471	158,769	487,955	3,136,667	44,300	20,701	5,585,932*	6·7
Midlands	4,207	1,345	1,998,740	133,595	641,887	4,231,943	48,189	19,400	7,222,526*	3·5
S. Wales	1,999	596	662,309	34,049	325,098	3,276,166	25,874	9,736	4,333,232	4·1
Merseyside & N. Wales ...	2,880	865	1,162,054	79,994	558,228	2,494,544	37,571	27,376	4,430,073*	6·7†
Yorkshire	4,209	1,438	1,684,901	88,407	590,866	4,739,336	58,087	94,128	7,420,911*	6·5
N. Eastern	3,019	958	961,859	56,431	451,077	2,644,631	33,104	56,809	4,203,911	7·2
N. Western	4,567	1,566	2,033,135	124,553	780,581	4,421,612	71,461	34,135	7,657,005*	4·2
Totals	44,151	14,536	20,612,384	1,166,113	8,405,423	33,202,005	588,280	385,940	65,310,344	6·3

* Including combined domestic and commercial supplies as follows (thous. kWh):—Southern, 114,651; Eastern, 149,687; East Midlands, 110,069; Midlands, 148,772; Merseyside and N. Wales, 70,306; Yorkshire, 165,186; North Western, 191,528.

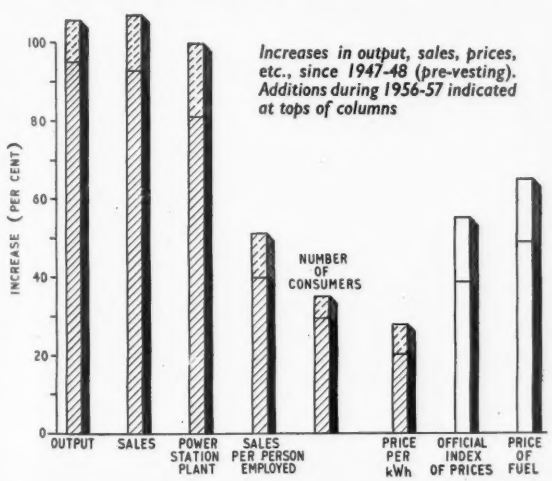
† Affected by transfer to C.E.A. of responsibility for certain railway traction supplies.

The report says that increasing interest is being shown in electric steel melting techniques and that progress is being made in the application of electric heat in the pottery and glass industries. A widening range of new appliances is likely to add to the diversified use of electricity in the home, particularly for laundry work. Steps were taken in conjunction with E.R.A. and E.D.A. to co-ordinate research on new methods of using electricity.

Research into the load characteristics of various types of users continued and much attention was paid to off-peak heating methods.

A tribunal was set up to assess awards to inventors and settle other financial matters arising between inventors and their employing Boards. During the year fifteen provisional patent specifications and five final specifications were filed. Arrangements were in operation or were being negotiated for the commercial development and exploitation of twenty inventions.

After a reference to the new National Inspection Council for Electrical Installation Contracts, the report mentions the adverse effect of the more rigorous hire-purchase controls. Because of national financial stringency no promotional advertising was undertaken in the national Press and no new appliances were let on hire. Consequently sales of cookers and water heaters were little different from those of the preceding year and were well below the 1954-55 level, although towards the end of the year they showed signs of recovery. It is considered unfortunate that no alleviation of purchase tax on appliances was possible, in view of their beneficial effect on load factor. Sales of washing machines fell by about half and refrigerators also suffered a setback.



The Boards' accounts for electrical contracting and the sale of " fittings " appear in a new form (Table 6). They show for the first time the best available estimates of the rents (including " notional " rents for properties owned by the Boards), rates and insurance attributable to these activities and the estimated net surpluses or deficits after taking those indirect costs into account (Table 7). The total average capital employed during the year is put at £13,172,000, excluding hire-purchase debtors and cash.

The increase in the number of employees was only 1·1 per cent. At 31st March the total was 182,924 of whom 1,332 were managerial and higher executive, 15,901 technical engineering, 40,847 executive, clerical, accountancy, sales, etc., 117,118 manual and 7,726 technical trainees and apprentices.

Particulars are given of negotiations in the various sections of wages and conditions of service and the joint consultation system is reported on at some length as are safety, health and welfare and education and training.

Finances

The electricity supply industry continued to be subject to credit and capital investment restrictions. At the Government's request the Authority and Boards reduced their capital development programme for 1956-57 from £213 million to £195 million by postponing certain work and this is expected to reduce the amount of plant to be brought into operation in 1958. The Boards had to incur more expenditure in connecting new consumers than had been forecast. Moreover, manufacturers were able to speed up plant delivery and it was found possible to make an early start on the nuclear power programme. As a result the capital expenditure amounted to £206 million which, in the circumstances, the Minister approved.

At the date of the report the Minister had approved a capital programme for 1957-58 costing £233 million; the increase is mainly accounted for by the accelerated nuclear power programme and the need to overtake arrears of distribution network reinforcement.

At 31st March last the gross book value of the industry's fixed assets was £2,082·08 million and the written-down value £1,313·53 million.

The Central Authority had a total trading revenue of £298·41 million (against £261·55 million in 1955-56) and the total expenditure on generation, purchase of electricity and main transmission was £279·39 million (£245·02 million). After deducting administration and other expenses, there was a surplus of £8,849,430 (£6,924,036). To this was added £3,880,000 from taxation reserve,

making £12,729,430. The supplementary reserve for depreciation of fixed assets receives £10 million, the central reserve fund £2 million and the balance (£729,430) is added to the amount of £2,328,802 brought forward, making £3,058,232 which is carried forward.

Works and other direct costs of generation accounted for £205·24 million and generation costs as a whole for £267·37 million, representing 92·3 per cent of the Authority's total expenditure. Fuel costs amounted to £175·35 million or 61 per cent of the expenditure on revenue account.

The Area Boards had an aggregate surplus of £2,869,485 (Table 8). Nine Boards made surpluses totalling £3,690,284 and the other three had an aggregate deficit of £820,799. The net result was that the balance on revenue and net revenue account fell by £632,515 to £9,906,716.

The revenue in pence per kWh received by the Boards (excluding inter-Board sales) was as follows, with the previous year's figure in parentheses:—London 1·870 (1·778); South Eastern 1·615 (1·574); Southern 1·641 (1·601); South Western 1·740 (1·655); Eastern 1·637 (1·593); East Midlands 1·402 (1·329); Midlands 1·386 (1·327); South Wales 1·220 (1·120); Merseyside and North Wales 1·373 (1·331); Yorkshire 1·247 (1·181); North Eastern 1·436 (1·344); North Western 1·400 (1·332); all Boards 1·484 (1·416). The revenue from various classes of consumers is shown in Table 9.

The consolidated surplus from trading of the Central Authority and Boards was £60,259,731. After adding other income and deducting interest (£46,877,588) and other expenses the surplus before transfers to or from reserves was £11,718,915. After the deduction of £2,000,000 for the central reserve fund and £900,000 for the Area Boards' reserve funds, an unappropriated balance of £96,915 was added to the amount brought forward, leaving a sum of £12,964,948 to be carried to the balance sheet.

In the nine years since vesting day, the surpluses have totalled £82·46 million. Of this total, £6·20 million has

TABLE 6. ELECTRICAL CONTRACTING AND SALES OF FITTINGS TRADING ACCOUNTS

Area Boards	Contracting								Sales of Fittings					
	Sales			Direct Cost of Sales					Sales					
	Cash and Credit	H.P. and Similar Sales	Total	Materials	Wages, Superannuation, etc.	Transport	Total	Gross Profit	Cash and Credit	H.P. and Similar Sales	Total	Direct Cost of Sales	Gross Profit	Total Gross Profit
	£	£	£	£	£	£	£	£	£	£	£	£	£	£
London ...	1,848,375	65,212	1,913,587	810,593	695,792	40,132	1,546,517	367,070	763,322	810,354	1,573,676	1,257,117	316,559	683,629
S. Eastern ...	1,265,474	51,367	1,316,841	558,527	388,620	1,506	948,653	368,188	1,132,445	1,050,863	2,183,308	1,711,808	471,500	839,688
Southern ...	1,613,222	153,411	1,766,633	682,276	562,560	67,344	1,312,180	454,453	1,313,594	984,375	2,297,969	1,793,484	504,485	958,938
S. Western ...	946,981	67,924	1,014,905	389,775	351,053	25,980	766,808	248,097	927,421	906,679	1,834,100	1,426,270	407,830	655,927
Eastern ...	2,372,526	256,435	2,628,961	1,263,964	778,278	58,740	2,100,982	527,979	2,054,137	2,154,632	4,208,769	3,288,652	920,117	1,448,096
E. Midlands ...	581,929	51,013	633,032	312,438	186,158	12,789	511,385	121,647	589,386	602,739	1,192,125	940,060	252,065	373,712
Midlands ...	2,420,726	344,454	2,765,180	1,484,783	658,465	62,921	2,206,169	559,011	1,249,371	2,063,265	3,312,636	2,619,856	692,780	1,251,791
S. Wales ...	561,533	101,437	662,970	340,197	189,285	4,930	534,412	128,558	369,594	463,701	833,295	652,250	181,045	309,603
Merseyside & N. Wales	710,581	89,400	799,981	417,629	240,092	20,028	677,749	122,232	507,072	851,806	1,358,878	1,066,558	292,320	414,552
Yorkshire ...	1,030,956	150,532	1,181,488	597,649	315,722	23,127	936,498	244,990	715,406	1,027,371	1,742,777	1,413,726	329,051	574,041
N. Eastern ...	464,793	46,500	511,293	278,069	129,808	5,696	413,573	97,720	391,789	543,253	935,042	761,628	173,414	271,134
N. Western...	1,190,909	248.594	1,439,503	678,299	404,738	46,899	1,129,936	309,567	1,078,176	2,143,095	3,221,271	2,566,296	654,975	964,542
Total ...	15,008,005	1,626,369	16,634,374	7,814,199	4,900,571	370,092	13,084,862	3,549,512	11,091,713	13,602,133	24,693,846	19,497,705	5,196,141	8,745,653

TABLE 7. CONTRACTING AND SALES OF FITTINGS NET REVENUE ACCOUNTS

Area Boards		Gross Profit (from Trading Accounts)	Indirect Costs*	Surplus or Deficit (−)	Percentages to Total Sales			Estimates of Rents, Rates and Insurances	Surplus or Deficit (−) after Charging Rents, Rates and Insurance
					Gross Profit	Indirect Costs	Surplus or Deficit (−)		
		£	£	£	%	%	%	£	£
London	1956–57	683,629	623,551	60,078	19·6	17·9	1·7	29,000	31,078
	1955–56	*782,062*	*594,142*	*187,920*	*18·1*	*13·7*	*4·4*		
South Eastern	1956–57	839,688	615,132	224,556	24·0	17·6	6·4	38,500	186,056
	1955–56	*862,999*	*558,713*	*304,286*	*23·0*	*14·9*	*8·1*		
Southern	1956–57	958,938	749,437	209,501	23·6	18·4	5·2	57,700	151,801
	1955–56	*932,128*	*732,705*	*199,423*	*21·2*	*16·7*	*4·5*		
South Western	1956–57	655,927	550,873	105,054	23·0	19·3	3·7	37,400	67,654
	1955–56	*624,255*	*544,507*	*79,748*	*22·0*	*19·2*	*2·8*		
Eastern	1956–57	1,448,096	1,334,181	113,915	21·2	19·5	1·7	67,700	46,215
	1955–56	*1,462,872*	*1,265,144*	*197,728*	*20·3*	*17·6*	*2·7*		
East Midlands	1956–57	373,712	309,644	64,068	20·5	17·0	3·5	22,900	41,168
	1955–56	*384,951*	*313,372*	*71,579*	*19·1*	*15·5*	*3·6*		
Midlands	1956–57	1,251,791	1,178,448	73,343	20·6	19·4	1·2	63,000	10,343
	1955–56	*1,284,899*	*1,146,594*	*138,305*	*20·8*	*18·6*	*2·2*		
South Wales	1956–57	309,603	341,354	(−)31,751	20·7	22·8	(−)2·1	19,600	(−)51,351
	1955–56	*359,362*	*318,353*	*41,009*	*21·0*	*18·6*	*2·4*		
Merseyside and North Wales ...	1956–57	414,552	358,665	55,887	19·2	16·6	2·6	34,700	21,187
	1955–56	*398,544*	*329,391*	*69,153*	*17·6*	*14·5*	*3·1*		
Yorkshire	1956–57	574,041	508,099	65,942	19·6	17·4	2·2	33,300	32,642
	1955–56	*694,003*	*487,533*	*206,470*	*19·8*	*13·9*	*5·9*		
North Eastern	1956–57	271,134	210,570	60,564	18·7	14·5	4·2	21,900	38,664
	1955–56	*312,812*	*194,213*	*118,599*	*18·8*	*11·7*	*7·1*		
North Western	1956–57	964,542	743,028	221,514	20·7	15·9	4·8	56,100	165,414
	1955–56	*920,502*	*708,187*	*212,315*	*19·9*	*15·3*	*4·6*		
Total	1956–57	8,745,653	7,522,982	1,222,671	21·2	18·2	3·0	481,800	740,871
	1955–56	*9,019,389*	*7,192,854*	*1,826,535*	*20·3*	*16·2*	*4·1*		

* Salaries, wages, superannuation, etc.; transport and travelling; sundry purchases and expenses; publicity, exhibitions, etc.; bad and doubtful debts; and proportion of general charges.

TABLE 8. AREA BOARDS' FINANCIAL RESULTS

Area Boards	Year	Trading Revenue	Trading Expenditure	Surplus from Trading		Other Income	Interest and Financing Expenses	Surplus, or Deficit (−), before Transfers to Reserves
				Amount	Percentage of Trading Revenue			
		£	£	£	per cent.	£	£	£
London	1956-7	50,230,380	47,824,821	2,405,559	4·79	278,261	1,856,804	827,016
	1955-6	*45,686,791*	*43,232,037*	*2,454,754*	*5·37*	*282,478*	*1,678,180*	*1,059,052*
South Eastern	1956-7	28,840,771	27,477,283	1,363,488	4·73	212,811	1,138,048	438,251
	1955-6	*25,951,743*	*24,715,671*	*1,236,072*	*4·76*	*226,222*	*1,033,929*	*428,365*
Southern	1956-7	35,069,472	32,834,596	2,234,876	6·37	203,458	1,658,686	779,648
	1955-6	*31,075,836*	*29,055,270*	*2,020,566*	*6·50*	*224,875*	*1,470,263*	*775,178*
South Western	1956-7	18,595,701	17,417,321	1,178,380	6·34	134,646	975,722	337,304
	1955-6	*16,522,809*	*15,261,240*	*1,261,569*	*7·64*	*137,334*	*892,877*	*506,026*
Eastern	1956-7	45,160,071	42,968,586	2,191,485	4·85	442,705	2,482,451	151,739
	1955-6	*40,964,925*	*38,123,346*	*2,841,579*	*6·94*	*422,027*	*2,208,018*	*1,055,588*
East Midlands	1956-7	33,407,912	31,711,742	1,696,170	5·08	123,947	1,794,289	25,828
	1955-6	*29,712,304*	*27,938,699*	*1,773,605*	*5·97*	*134,780*	*1,600,471*	*307,914*
Midlands	1956-7	42,278,572	40,872,558	1,406,014	3·33	266,295	1,954,199	−281,890
	1955-6	*39,157,161*	*36,996,874*	*2,160,287*	*5·52*	*303,759*	*1,796,137*	*667,909*
South Wales	1956-7	22,175,805	21,049,458	1,126,347	5·08	96,520	1,089,148	133,719
	1955-6	*19,632,347*	*18,989,310*	*643,037*	*3·28*	*93,442*	*896,767*	*−160,288*
Merseyside and North Wales	1956-7	25,678,948	25,010,746	668,202	2·60	141,762	907,372	− 97,408
	1955-6	*23,362,484*	*22,569,432*	*793,052*	*3·39*	*133,450*	*785,768*	*140,734*
Yorkshire	1956-7	39,040,767	37,846,535	1,194,232	3·06	318,691	1,954,424	−441,501
	1955-6	*34,921,289*	*33,612,214*	*1,309,075*	*3·75*	*337,878*	*1,724,686*	*− 77,733*
North Eastern	1956-7	25,533,586	23,795,391	1,738,195	6·81	170,784	1,118,150	790,829
	1955-6	*22,392,813*	*21,238,413*	*1,154,400*	*5·16*	*198,205*	*986,485*	*366,120*
North Western	1956-7	45,420,113	43,638,059	1,782,054	3·92	282,860	1,858,964	205,950
	1955-6	*41,503,353*	*39,903,741*	*1,599,612*	*3·85*	*354,730*	*1,735,001*	*219,341*
Totals	1956-7	410,181,851*	391,196,849*	18,985,002	4·63	2,672,740	18,788,257	2,869,485
	1955-6	*369,580,681**	*350,333,073**	*19,247,608*	*5·21*	*2,849,180*	*16,808,582*	*5,288,206*

* These totals exclude inter-Area Board bulk supplies: 1956-7, £1,250,247; 1955-6, £1,303,174.

been placed to taxation reserves, £33·25 million to supplementary depreciation reserves and £30·05 million to general reserves, the balances carried forward being £12·96 million.

The reports and accounts of the twelve Area Boards for the year ended 31st March last have also been published; they will be reviewed in our next issue.

MINISTER'S REPORT

In his statutory report for the year ended 31st March, 1957, the Minister of Power (Lord Mills) first deals with the Electricity Act, 1957, which provides for the dissolution of the C.E.A. and the setting-up of an Electricity Council and Central Electricity Generating Board. Appointments and re-appointments to and retirements from the Central Authority and Boards are recorded.

The Minister approved plans for a capital expenditure of £233 million for 1957-58; no provision was made for new finance for hire-purchase. Plans have been approved for the commissioning in 1962 of 2,294 MW (sent out) of generating plant, which with plant to be commissioned by the South of Scotland Electricity Board will make 2,500 MW.

The Central Electricity Authority informed the Minister that work on the deferred Rheidol and Ffestiniog hydro-electric schemes would be restarted in April, 1957.

Reference is made to the enlargement of the nuclear power programme to bring 6,000 MW of plant into operation by 1965.

Since the end of the period the Minister has given his approval to the construction by 1961 of a cross-Channel cable to link the systems of the C.E.A. and Electricité de France at a cost of about £4 million to be borne equally by the two countries.

Programmes submitted by the Central Authority and Area Boards for research and for education and training were approved and the Minister reached agreement with the Boards on changes in the form of accounts for their retail trading activities. Note is made of the increase of the "standard amount" on which pool payments in lieu of rates are based. Other matters dealt with include the approval of the payment of supplementary pensions to ex-company and other pensioners.

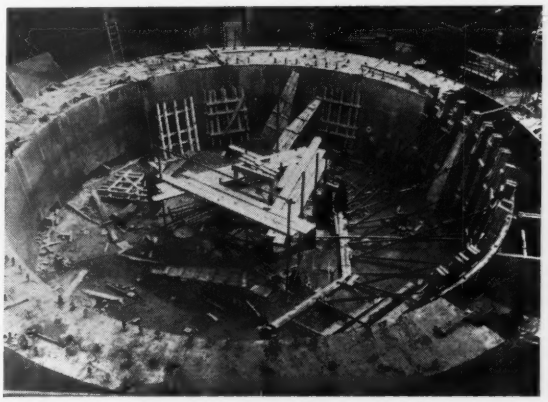
No British Electricity Stock was issued during the year; the C.E.A.'s requirements for long-term capital finance were met by advances by the Minister under the Finance Act, 1956. By the end of the year £148 million had been advanced, including £60 million to reduce temporary borrowing from the banks. These advances are to be repaid in equal annual instalments over a period of 25 years; interest at the rate of 5¼ per cent is being charged on advances made between August, 1956, and January last and 5 per cent on those made in February and March. Details are given of temporary borrowing approved.

Particulars are given of compulsory purchase orders made by the C.E.A. and Boards and of consents to the

TABLE 9. REVENUE PER KWH SOLD (PENCE)

Class	1955-56	1956-57
Industrial	1·195	1·265
Commercial	1·943	2·016
Domestic	1·533	1·581
Combined domestic & commercial	1·735	1·778
Farm	1·496	1·521
Traction	1·152	1·230
Public lighting	1·448	1·518
Totals, all classes	1·403	1·469

The plinth of No. 1 reactor at the Bradwell (Essex) station in course of erection (Essex County Standard)



erection or extension of power stations, which included one for the Hinkley Point nuclear power station. Three extensions approved—Plymouth "B," Spondon and Skelton Grange "B"—will total 270 MW.

The rest of the report deals with a number of overhead line matters, the Electricity Supply Regulations and electricity meters.

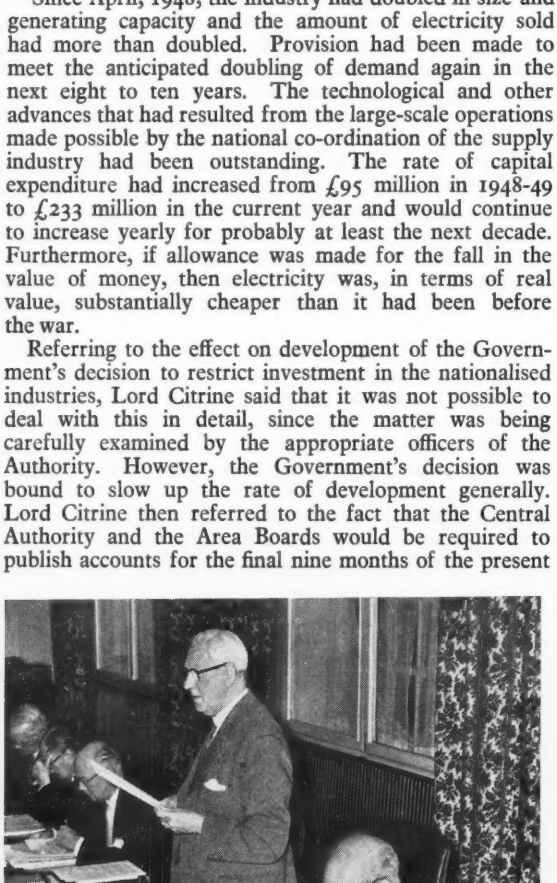
LORD CITRINE'S REVIEW

At a Press conference in London on Tuesday Lord Citrine said that it was the ninth occasion on which he had had the pleasure of reviewing and discussing the annual reports of the C.E.A., and it would be the last. In view of this, he commented on the Authority's ninth annual report and also reviewed briefly the changes which had taken place in the electricity supply industry during the nine years it had been co-ordinated under the Central (formerly British) Electricity Authority.

Since April, 1948, the industry had doubled in size and generating capacity and the amount of electricity sold had more than doubled. Provision had been made to meet the anticipated doubling of demand again in the next eight to ten years. The technological and other advances that had resulted from the large-scale operations made possible by the national co-ordination of the supply industry had been outstanding. The rate of capital expenditure had increased from £95 million in 1948-49 to £233 million in the current year and would continue to increase yearly for probably at least the next decade. Furthermore, if allowance was made for the fall in the value of money, then electricity was, in terms of real value, substantially cheaper than it had been before the war.

Referring to the effect on development of the Government's decision to restrict investment in the nationalised industries, Lord Citrine said that it was not possible to deal with this in detail, since the matter was being carefully examined by the appropriate officers of the Authority. However, the Government's decision was bound to slow up the rate of development generally. Lord Citrine then referred to the fact that the Central Authority and the Area Boards would be required to publish accounts for the final nine months of the present regime, from 1st April to 31st December, 1957. The industry was subject to seasonal and weather variations and any broken accounting such as this was bound to produce a distorted financial picture. The probable outcome would be that practically all the Area Boards would show deficits in their accounts at the end of this year. The results would also be adversely affected by a substantial rise in the cost of fuel and by the increase of 2 per cent in the Bank Rate. In spite of this, the industry was financially sound and if the accounts were to run for the full twelve months there would probably have been a bigger surplus than in 1956-57.

Answering a question on the possibility of a second cross-Channel cable linking Britain with France, Sir Josiah Eccles (deputy chairman) said that work was in progress on a single d.c. cable link which should come into operation during 1960. No hard proposals had been made for a second cable but, if the first cable was successful there might possibly be scope for considering the installation of a second.



Lord Citrine, chairman, explaining the C.E.A.'s 1956-57 report at his Press conference on Tuesday. On his right are Sir Henry Self, deputy chairman (administration) (not visible in picture), Mr. E. Long, secretary, Mr. A. M. Scott, chief accountant, and Mr. R. A. Finn, chief legal adviser. On his left are Sir Josiah Eccles, deputy chairman (operation), and Mr. F. H. S. Brown, chief engineer

Canadian Petroleum Industry

THE Council of the British Manufacturers of Petroleum Equipment, 2, Princes Row, Buckingham Palace Road, London, S.W.1, has issued the report (12s 6d net) of the Economic, Technical and Goodwill Mission to Canada in May-June this year, sponsored by the Council. The purpose of the Mission was to study ways and means of expanding the volume of trade with the oil and petro-chemical industries in Canada. A section of the report deals with the electrical equipment required for refining, petro-chemical and gas plant.

After reviewing the system of supply, types of equipment in use and the costs of power per kWh to bulk users in various areas, the report details the electric motor requirements and mentions that all motors must be to C.E.M.A. specifications, with the exception of McColl-Fontenac, who for the present do not appear to follow any dimensional standards. In hydrogen areas, nitrogen pressurised motors are used (to Class 1, Group B of the Underwriters' Code), in hazardous areas Class 1, Group D (hydrocarbon gases heavier than air, corresponding to British Groups 1 and 11 gases). Underwriters'-laboratory-certified explosion-proof motors are used almost exclusively, one exception being pipe ventilated synchronous motors and very large induction motors with slip rings.

For larger motors, heaters and thermal protection in the windings are required. Some companies require three thermal elements per phase. Protection devices operate alarms and, in one refinery, temperature recorders.

Flameproof lighting fittings are used on the units and in control rooms, vapour tight or high level industrial fittings in semi-hazardous areas, and elsewhere industrial fittings. Special fluorescent lighting, guaranteed to give full illumination in severe cold weather, is common.

Electricity distribution practice follows well-known company standards set up by the major oil companies. Cables are laid at least six feet deep to avoid solid frost. L.v. cables, both underground and overhead, are rubber insulated and neoprene jacketed, and h.v. cables are paper insulated, lead covered, sometimes double armoured and sometimes p.v.c. sheathed over armour.

Dealing with standards and regulations, the report states that all equipment must have C.S.A. approval. Motors must be to C.E.M.A. general installation, and application practice is governed by the Federal Canadian Electrical Code with the over-riding power by Provincial governments to enforce their own codes of safety and practice. Large projects are, as a rule, let to contractors, on a fixed price, "turnkey" basis, sometimes with a bonus or penalty clause for completion. Engineering, in the majority of cases, is done by the contractor in the United States and standard U.S. drawings are used.

Tariff Implications

By P. SCHILLER, Dipl.Ing., M.I.E.E.*

IT is well known that the total cost of supplying a given class of consumers can be visualised as being composed of (1) energy cost, related to kWh consumed; (2) demand-related standing cost; and (3) residual standing cost, largely dependent on the number and size of consumers. Taking the class of industrial consumers, allocation of item (1) to individual consumers presents, of course, no difficulty; item (2) can be allocated according to maximum demand, whereas item (3) can be allocated either as a "service charge" or merged with items (1) and (2). In allocating the demand-related cost, account must be taken of inter-consumer diversity, which tends to make the collective m.d. of a group of consumers lower than the sum of their individual m.d.s. The ratio of the sum of individual m.d.s to the group m.d. is known as the inter-consumer, or group, diversity factor, and its reciprocal as the corresponding coincidence factor. The latter thus expresses what fraction of the individual m.d.s. coincides, on the average, with the group m.d.

It can also be interpreted as indicating the probability of coincidence. If a group contains consumers with a load factor of 100 per cent, their individual m.d.s are bound to coincide with the group m.d., and the coincidence factor in respect of such consumers is, therefore, unity. On the other hand, there is every reason to suppose that for consumers with lower load factors, the probability of coincidence between individual m.d. and group m.d. will decrease in some relation to their load factors. In view of the wide range of deviation from the overall coincidence factor of a group of consumers that is possible, cost allocation to individual consumers can be made correctly only if the actual average relationship between an individual consumer's load factor and corresponding group coincidence factor is known. A group-diversity-factor/consumer's-load-factor curve, based on data collected in the north east, was given by Messrs. E. H. E. Woodward and W. A. Carne in their reply[1] to the discussion on their classic I.E.E. paper on cost analysis.[2]

The first large-scale systematic investigation into this relationship was, however, carried out by Constantine Bary in America,[3] based on small and medium commercial and industrial consumers, and—in accordance with American practice—on monthly load factors. The curves produced by him showed that up to a load factor of about 20 per cent, the group coincidence factor rose almost in direct proportion to the load factor of the individual consumers; from about 20 to 80 per cent, it was approximately constant; and at 100 per cent load factor, of course, it was unity.† In choosing consumers for test, load factor groups of thirty were formed and for each group consumers of similar m.d.s were taken, or the load curve of each consumer was scaled up or down to make the m.d.s equal.

† A mathematical approach may be found in Ref. [4].

CONSUMERS' LOAD FACTOR, GROUP COINCIDENCE FACTOR AND TWO-PART TARIFFS

Consequently the curves, giving the ratio of collective m.d. to the sum of the individual m.d.s for each load-factor group, relate to consumers of approximately equal m.d. within each group, and it was found that groups of ten gave almost the same coincidence factor as the groups of thirty. In contrast to domestic consumers, for instance, where individual equipment, hours of use, etc., are far more varied, this does not appear surprising.

To obtain comprehensive information based on present-day conditions in this country, the Utilisation Research Committee of the Central Electricity Authority and Area Boards approved large-scale tests on industrial consumers on m.d. tariffs with m.d.s between 20 and 1,000 kW, of which a national sample of several thousand was available. It was classified into eleven groups of consumers according to annual load factor (from 5 to 30 per cent at 5 per cent intervals, and from 30 to 90 per cent at 10 per cent intervals); from each group, a sub-sample of 15 to 25 consumers was selected, according to the importance of the group; and load recorders were installed with all consumers of each load-factor group simultaneously for two to three weeks in the winter of 1954/55. By summation of the load records of each group, the collective m.d. for the test period was obtained; and division of this m.d. by the sum of the individual consumers' annual m.d.s gave the corresponding coincidence factor, on the assumption that the test period happened to contain the annual collective m.d.

The investigation was based on *annual* load factor and on kW, rather than kVA, because in British conditions of large seasonal variation in demand, allocation of demand-related cost must be based on demand at the times when system demands are at their annual highest, and the instruments used recorded the demand in kW. In any case, it is of course more consistent to link kWh-consumption to kW-demand when expressing load factor, which is really the ratio of mean demand to maximum demand.

Group-Coincidence-Factor/Annual-Load-Factor Curve

In Fig. 1, the resulting coincidence factors are plotted at the mid-points of the corresponding load-factor intervals. In spite of the scatter, a clear pattern emerges. Apart from possible errors in measurement, records, etc., the scatter can largely be attributed to the extended time over which the test records had to be taken: the 15 to 20 per cent group, for instance, was tested in the second half of January, the 20 to 25 per cent group more than a month later, and the 50 to 60 per cent group as late as the end of March. While for all load-factor groups the limited size of the samples tends to produce a slight over-estimate of the coincidence factor, the improbability

* Central Electricity Authority.

of the collective m.d. during the test period being the highest annual value has the opposite effect—smallest, of course, with those tests taken in the darkest and coldest part of the test period. With due regard to these influences, the idealised smooth curve, 1, has been drawn, which, it will be seen, rises between the origin and close on 20 per cent load factor in direct proportion to the load factor, then tends to flatten out slightly above 0·8 coincidence factor, eventually reaching unity coincidence factor at 100 per cent load factor.

It can easily be shown that the collective load factor of a group of consumers with the same individual load factor equals the latter divided by the coincidence factor. Consequently, for the range of load factor over which the coincidence factor grows directly proportionally, the collective load factor remains constant: for Curve 1 in Fig. 1, approximately 23 per cent. In other words, groups of consumers with individual load factors of, say, 5, 10 or 15 per cent, will all have a collective load factor of about 23 per cent, representing the minimum for groups of industrial consumers of the size range concerned.

Also reproduced in Fig. 1 is Bary's curve, designated "2." Apart from the section between about 15 and 30 per cent, for which Curve 1 gives appreciably higher coincidence factors, the two curves are rather similar, which is particularly remarkable because Curve 1 is based on representative mixtures of consumers with m.d.s from 20 to 1,000 kW, whereas Bary's load-factor groups consisted of consumers with equal m.d.s.

Overall Coincidence Factors and Load Factors

The load records obtained were also used to derive estimates of the overall coincidence factor and load factor of the whole sample of consumers with m.d.s between 20 and 1,000 kW, and for the two sub-ranges of 20 to 200 kW and 200 to 1,000 kW, as set out in the table below.

OVERALL COINCIDENCE FACTOR AND LOAD FACTOR

	M.D. Group		
	20-200 kW	200-1,000 kW	20-1,000 kW
1	2	3	4
Coincidence factor	0·69	0·79	0·75
Load factor, per cent	33	40	38

As the records for the individual load-factor groups relate to a variety of days, an investigation based on simultaneous load records taken on a single dark and cold winter day would, of course, yield higher coincidence factors and lower load factors. How great the difference might be is difficult to guess, but the group coincidence factor for consumers with m.d.s between 20 and 200 kW is certainly higher than 0·7, for the 200 to 1,000 kW group higher than 0·8, and for their combination most likely of the order of 0·8.

Tariff Implications

The findings relate, of course, only to medium-sized industrial consumers of the m.d. range in question, the bulk of whose demands is due to uses other than lighting and space heating, but the results are of some importance in the design of tariffs. Suppose that such consumers were to be treated as a separate class, and that the demand-related cost (with an appropriate proportion of the residual standing cost) of supply to that class could be ascertained with reasonable accuracy.

Modern theory is veering away from the orthodox "peak-responsibility" principle, according to which the demand-related cost (or even the whole standing cost) was allocated to consumer classes *pro rata* to their contributions to the system peak (i.e. *pro rata* to their demands at a single half-hour of the year under consideration) towards some assessment of class demands which takes account of the potentiality of a system peak developing at other times of day.

The ascertained standing cost as described above could be divided by such an assessed class demand to yield a cost per kW for the class, which could then be translated into the kilowatt charge of a two-part tariff by multiplying by the overall coincidence factor of, say, 0·8. In this way the total standing cost would be recovered, and it will be clear that a simple two-part tariff on this basis would serve individual consumers with load factors in the approximate range 20 to 60 per cent with reasonable equity; but since the group coincidence factor of low-load factor consumers is much less than 0·8, they would be overcharged, to the benefit of high-load-factor consumers with coincidence factors well above 0·8. However, Curve 1 of Fig. 1 enables the "true cost" to be derived for varying individual consumers' load factors by multiplying the above cost per kW of group m.d. by the group coincidence factors for various load-factor groups.‡ In Section (a) of Fig. 2, Curve A shows this "true cost" expressed as a cost per kWh, added to the running cost, "a," per kWh, and plotted against individual consumer's load factor. The curve resulting from applying a single coincidence factor (0·8) is also shown, and designated "B." It will be seen that the "true cost" curve levels out below about 15 per cent load factor, whereas Curve B rises steeply in accordance with its hyperbolic nature. No actual cost scale is given, as this is unnecessary for the argument.

The "true cost" curve cannot directly be translated into a straight two-part tariff. The usual way of alleviating the impact of such a tariff on the low-load-factor consumer consists in "tilting," i.e. reducing the kW charge and increasing the kWh charge, as illustrated by Curve C; but while still giving excessive values for consumers with very low load factors, this would lead to substantial overcharging of high-load-factor consumers.

‡ Theoretically, some allowance should also be made for inter-load-factor-group diversity; the corresponding coincidence factors can, however, be assumed to be very high.

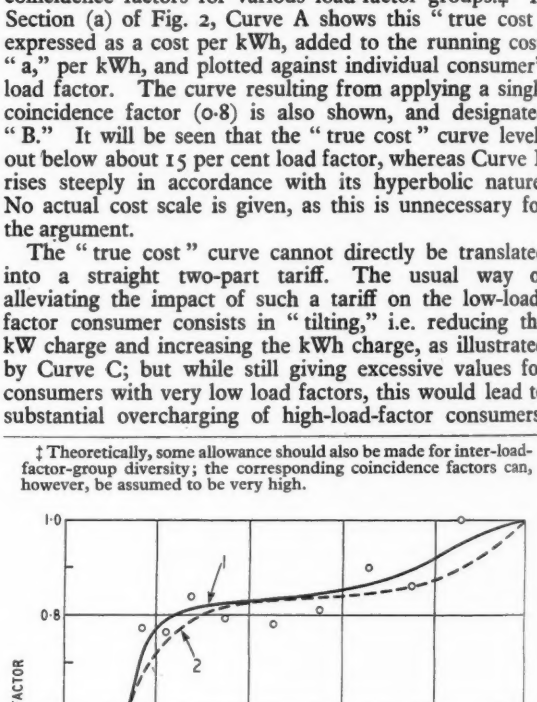


Fig. 1.—Individual consumer's load factor and group coincidence factor

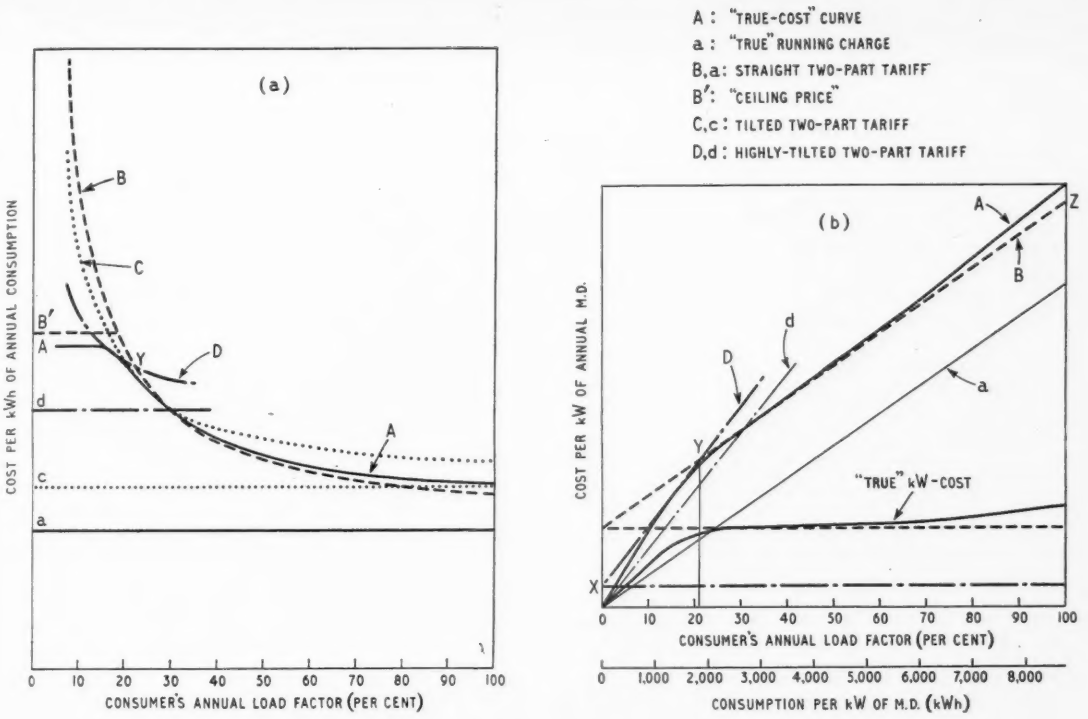

A : "TRUE-COST" CURVE
a : "TRUE" RUNNING CHARGE
B,a: STRAIGHT TWO-PART TARIFF
B′: "CEILING PRICE"
C,c : TILTED TWO-PART TARIFF
D,d : HIGHLY-TILTED TWO-PART TARIFF
(a)
COST PER kWh OF ANNUAL CONSUMPTION
CONSUMER'S ANNUAL LOAD FACTOR (PER CENT)
(b)
COST PER kW OF ANNUAL M.D.
"TRUE" kW-COST
CONSUMER'S ANNUAL LOAD FACTOR (PER CENT)
CONSUMPTION PER kW OF M.D. (kWh)

Fig. 2.—Two-part cost allocation. (a) Expressed as cost per kWh. (b) Expressed as cost per kW of maximum demand

Such consumers, if not qualifying for treatment by special agreement, could be catered for by small steps in the kWh-charge according to load factor. However, tilting can be avoided altogether and a closer approach to the "true cost" curve achieved by (*a*) supplementing the untilted formula, represented by Curve B, by a "ceiling price" per kWh, shown as B′, to be charged if the annual cost per kWh resulting from the basic two-part tariff comes out higher; (*b*) by an optional very-highly-tilted two-part tariff for adoption by low-load-factor consumers, illustrated by Curve D; or (*c*) by a combination of the latter tariff with the untilted tariff, effected by limiting the high kWh-charge of the tilted tariff to the number of kWh per kW of m.d. corresponding to the annual load factor of the intersection, Y, of Curves B and D, and applying to each excess kWh the low kWh-charge of the untilted tariff.

Maximum Demand Basis

These alternatives are further illustrated in Section (b) of Fig. 2, showing them expressed as cost per kW of the individual consumer's m.d., instead of per kWh of consumption. In this representation, the kW-cost payable under a two-part tariff appears as a horizontal line (instead of a hyperbola) and the kWh-charge as a sloping straight line through the origin, the slope increasing with the magnitude of this charge. Consequently, the total cost for various load factors also appears as a straight line (B and D) intercepting the *y*-axis at the corresponding kW-cost. The kW component of the "true cost" formula, however, varies with the load factor and, therefore, appears as a curve (resembling Curve 1 of Fig. 1), as does the total "true cost" Curve A. Finally, the tariff resulting from a combination of B and D is represented by X-Y-Z, the abscissa of Y representing the consumption per kW of m.d. chargeable at the high kWh-rate.

It will be appreciated that these are only broad outlines of tariff implications and that in the detailed framing of appropriate two-part tariffs some other, minor, factors also need to be taken into account.

REFERENCES

[1] *Journal I.E.E.*, 1932, Vol. 71, p. 908.
[2] "An Analysis of the Costs of Electricity Supply, in Relation to Various Types of Consumers," *ibid.*, p. 852.
[3] "Coincidence-Factor Relationships of Electric Service-Load Characteristics," *Transactions* A.I.E.E., 1945, Vol. 64, p. 623.
[4] Hamilton, R. F. : "The Summation of Load Curves," *ibid.*, 1944, Vol. 63, p. 729.

Opportunities in Iraq

THE prospects for United Kingdom manufacturers of domestic electrical appliances are discussed by the Commercial Secretariat of the British Embassy at Baghdad in an article on the developing market of Iraq published in the *Board of Trade Journal*. This states that the provision of water and electricity in towns and villages opens a wide field for the sale of appliances. Air conditioning and ceiling fans, for example, are no longer regarded as a luxury. United Kingdom manufacturers of large-scale installations have a share of this market, but make little impression against United States competition in the provision of smaller domestic units. A competitively priced domestic unit should sell well, but it must be able to work in temperatures over 120 deg F and be backed by a good spares and service organisation. During 1955 and 1956 the output of electricity in Iraq increased by 70,000 kW to 230,000 kW, and as the standard of living rises the demand for a much wider range and better quality consumer and even luxury goods will develop. A table of the principal imports into Iraq shows the rapidly increasing value of imports of electrical machinery and appliances. In 1954 the value was £3·58 million, in 1955 £4·79 million and in 1956 £8·44 million.

Printing Works Change-Over

New Power Plant and Lighting at Chapel River Press

FOLLOWING proposals to replace part of the existing generating plant which was installed at the Chapel River Press (Kelly's Directories, Ltd.) at Andover in October, 1931, it became necessary to investigate the advisability of changing over completely to public supply. With the exception of one set the generating equipment was considered to be well past its normal life and it was anticipated that maintenance charges as well as the cost of spares would rise. The difficulty of obtaining spares for obsolete equipment would also have to be faced together with the rising cost of fuel. Apart from this consideration the management had at that time to deal with the question of improving the general standard of illumination throughout the works.

The Chapel River Press is an organisation devoted to printing and bookbinding and is a self-contained unit made up of stereotype, monotype and linotype departments, composing room, machine room, binding department, lithographic department and offices.

The original power plant consisted of six oil engine driven 220 V d.c. generators. Three were rated at 120 kW, one at 188 kW, one at 250 kW and the sixth at 18 kW, a total installed capacity of 816 kW. All the engines were supplied by Petters, Ltd., and were of the "Atomic" diesel type. Under average working conditions the maximum demand is of the order of 350 kW and plant has a load factor of 16·8 per cent.

The annual factory consumption is made up as follows:—Metal heating 160,000 kWh; motor drives 210,000 kWh; lighting 140,000 kWh; boiler house, engine auxiliaries and battery charging 60,000 kWh. The works load is a very erratic one because of seasonal demands and full load is often experienced for only a few hours. Full heating is used in the factory from 6.15 a.m. and in the winter months the hot water circulators were kept running throughout the night and supplied from the 18 kW generating set.

In order to cater for the works load the Southern Electricity Board erected in the grounds of the works a new substation which houses a 400 A, 11 kV type ring-main unit. The scheme involved looping the local 11 kV underground feeder in and out of this gear and laying a new length of 11 kV three-core cable to a 500 kVA, 11,000/415 V transformer installed outside the existing power house. Four single-core p.i.l.c. l.v. cables, three 0·75 sq in and one 0·25 sq in, were taken in earthenware ducts from the l.v. side of the transformer to a 1,000 A, 25 MVA circuit-breaker in the power house. This is a triple-pole, horizontal draw-out, fully interlocked oil circuit-breaker fitted with three over-current trip coils with oil dashpot time lags, one 30 V d.c. shunt trip coil and associated switch. There are four 1,000/5 A, 30 VA Class "C" ring type current transformers for earth fault and over-current protection and three 1,000 A, 15 VA similar transformers for instrument and meter duty.

The new l.v. switchgear in the power house is of the floor mounting, metalclad industrial pattern embodying the above-mentioned oil circuit-breaker for controlling the incoming supply from the 500 kVA transformer and ten outgoing fused switch circuits equipped with c.t. operated ammeters measuring the centre phase current. There are three 300 A and two 60 A switch-fuses mounted below

An impression of the level of illumination in part of the bindery before the change-over

Photograph taken after the change-over showing the same part of the bindery seen on the opposite page

the busbar chamber, and above the busbars are mounted two 300 A, two 200 A and one 60 A units.

Two of the 300 A switches control the supply to two 112·5 kW English Electric air-cooled, steel tank rectifiers and the 60 A switch controls the supply to a Philips 16·5 kW rectifier. The choice of the type and capacity of the rectifiers was carefully considered in view of the immediate works m.d. and also the fact that certain d.c. machines were scheduled for replacement by a.c. These rectifiers provide power for the bulk of the factory plant which at the time of the change-over was all d.c. equipment. It is anticipated that the works power load will be transferred to a.c. as the existing d.c. motors become obsolete.

There are 33 10/12 h.p. 220 V d.c. compound-wound motors fitted with control gear to give 100 per cent speed variation. The cost of replacing these motors by variable a.c. motors was considered prohibitive, particularly in view of the fact that many are comparatively new. There are, in addition, about 150 small d.c. motors ranging from fractional sizes to 5 h.p.

It was found after a detailed investigation that the provision of rectifiers and a new a.c. switchboard would result in a saving of several thousand pounds over a scheme which included a complete change-over to a.c. drives throughout. Furthermore, the scheme involving only part change-over would not interfere with production as the machine drives, controls and the wiring remained unaltered. It was decided that the company's best interests would be served by changing over to a.c. drive only when new machinery was installed. However, the ultimate replacement of d.c. motors with a.c. had to be considered and it was decided that for constant speed drives the squirrel-cage a.c. motor would be admirably suited for driving air compressors, guillotines, a baler and a hydraulic press.

Variable-speed motors are needed for certain types of press drive, especially those for multi-colour working where correct alignment of successive colours is essential. They are also required for drives where the actual speeds obtained are relatively unimportant provided that a given overall percentage reduction or increase in the normal speed is obtainable. With the exception of the press drives the size of motor employed for variable-speed duty is small and it was decided that the works requirements could be met by a.c. motors with resistance control. It is anticipated that a.c. commutator motors will ultimately replace the existing d.c. motors used for certain types of press drive.

Lighting Installation

The works lighting originally consisted entirely of tungsten lamps and it will be seen from the following table prepared by Messrs. C. Mackechnie Jarvis & Partners, consulting engineers, London, that the installation of fluorescent lighting meant a higher luminous intensity for a very much reduced power consumption. Allowing the same diversity and load factors, it was estimated that a change to fluorescent lamps throughout

Department	Approx. Area (sq ft)	Existing Lighting		A.C. Fluorescent	
		Lumens	kW	Lumens	kW
Composing ...	13,100	19·0	38·0	30	19·6
Machine Room ...	12,400	15·8	27·3	30	18·4
Binding I	12,400	11·0	22·0	30	18·4
Binding II	11,600	15·6	25·0	30	17·3
Suttley	11,600	15·6	25·0	30	17·3
			137·3		91·0

the works would reduce the consumption to 92,000 kWh per annum.

Seven schemes for the lighting of the works prepared by various manufacturers were submitted by the British Central Electrical Co., Ltd., to the works for consideration, and from these the Crompton scheme utilising "Light-Line" continuous trunking and open top reflectors was chosen. The trunking type of installation was chosen in order to give flexibility of lighting and also to provide accommodation for other works services. The fluorescent tubes are of the "new warm white" type.

In departments other than the composing room, the majority of the fittings installed are of the twin-tube pattern; in the composing room, where a higher level of intensity is required, single-tube fittings have been installed. The visual task in the composing room is dependent upon obtaining reflections of the lighting source on the type faces and the almost continuous line of light is preferable for this purpose to a system of two-lamp fittings at wider spacing as installed in the remaining departments. Although a stroboscopic effect is extremely unlikely with modern fluorescent lighting equipment, steps were taken to avoid the possibility by ensuring that adjacent fittings were connected to different phases of the supply.

The whole of the installation with the exception of the high-voltage extension was carried out by the works staff under the supervision of Mr. S. Bellringer, works engineer. The power and lighting equipment was supplied by the British Central Electrical Co., Ltd.

MACHINES AND VENTILATION

A Recent Court Decision

BY F. E. SUGDEN

GREAT emphasis is placed on ventilation in factories and workshops, particularly where furniture is manufactured, and all kinds of means are devised to make conditions satisfactory for the workers in order to overcome the danger of contracting diseases caused by inhaling dust. The Factory Acts are very strict on this point and Factory Regulations are constantly being revised to safeguard the employee. The employer, on the other hand, is always ready to adopt improved ways and means to overcome this danger and the question which is uppermost in his mind is whether the steps taken by him are sufficient to safeguard his staff and comply with the Factory Acts and the Factory Regulations.

A recent case in the Queen's Bench Division illustrates some of the difficulties. Briefly the facts were these: the plaintiff was employed by the defendant company in a workshop in which furniture was manufactured and in which there was an electric sanding machine. At the time of an accident the machine was mainly used on West African hardwoods and produced a fine wood dust. The plaintiff worked some ten or fifteen yards away from this sanding machine and the wood dust settled on his coat, which hung near him, in sufficient quantities to require brushing off.

The ventilation in the workshop was adequate for ordinary purposes but was inadequate as a means of removing the wood dust. It was established that, in general, no precautions were taken in the furniture trade against disease from wood dust and that the defendants' assistant works manager received all the information commonly circulated in the trade.

The plaintiff brought an action against the defendants for personal injuries, for negligence at common law, and also for breach of statutory duty under Section 4 (1) and Section 47 (1) of the Factory Act, 1937. Section 4 (1) provides that "Effective and suitable provision shall be made for securing and maintaining by the circulation of fresh air in each work room the adequate ventilation of the room and for rendering harmless, so far as practicable, all fumes, dust and other impurities that may be injurious to health generated in the course of any process or work carried on in the factory."

Section 47 (1) reads as follows: "In every factory in which, in connection with any process carried on, there is given off any dust or fume or other impurity of such a character and to such extent as to be likely to be injurious or offensive to the persons employed, or any substantial quantity of dust of any kind, all practical measures shall be taken to protect the persons employed against inhalation of the dust or fume or other impurity and to prevent its accumulating in any workroom, and where the nature of the process makes it practicable, exhaust appliances shall be provided and maintained, as near as possible to the point of origin of the dust or fume or other impurity, so as to prevent it entering the air of any workroom."

The judge decided that the plaintiff's claim for damages failed for the following reasons:—(1) The defendants were not in breach of their common law duty of care as (*a*) they did not know, nor on the evidence ought they to have known, that the wood dust was a source of danger, and (*b*) they were not guilty of obvious neglect.

(2) The defendants were not in breach of statutory duty because (*a*) Section 4 (1) of the Factory Act, 1937, on its true construction, was concerned only with the provision of adequate ventilation for ordinary purposes by the circulation of fresh air, which was adequate in this factory, and did not extend to such matters (for example, the provision of exhaust appliances) as they were within the scope of Section 47 of the Factory Act of 1937; (*b*) the obligation imposed by Section 47 (1) to take all practicable measures to prevent dust accumulating was an obligation to prevent an accumulation of deposited dust, not to prevent dust settling on the plaintiff.

Broadly speaking, this case establishes the fact that the use of a particular machine cannot be called in question if the owner of the factory has taken all reasonable steps, with the latest knowledge at his disposal, to prevent injury to his workpeople.

"Co-operative Electrical Research"

THE Electrical Research Association announces that its house journal entitled "Co-operative Electrical Research," the first two numbers of which were issued to members only, has now been put on its list of publications.

In addition to an account of the Association's activities, No. 3 (3s 1d by post from the E.R.A., Dorking Road, Leatherhead) contains articles on research developments relating to flameproof enclosures, transformer noise, transformer and switch oils, and tracing insulation faults.

Public Lighting Engineers

PROCEEDINGS AT TORQUAY CONFERENCE

AS we reported in our last issue, in which abstracts of the papers were published, the 1957 annual conference of the Association of Public Lighting Engineers at Torquay was officially opened at the Town Hall on 17th September by the Mayor of Torquay (Councillor A. L. Goodrich, J.P.), who welcomed the delegates, particularly those from overseas.

The president (Mr. H. Carpenter, M.I.E.E., F.I.E.S., illuminations and public street lighting officer, Blackpool), thanked the Mayor and echoed the welcome to overseas delegates, among whom were representatives from Belgium, Holland, France, Southern Rhodesia, Kuwait, Hong Kong and Australia. He also expressed the Association's deep regret that ill-health had prevented Mr. Norman Axford (South Western Electricity Board) from becoming president for the ensuing year.

Mr. A. N. Irens (chairman, South Western Electricity Board) paid a tribute to Mr. Axford for his activities on behalf of the Association since 1936 and said he was glad to report that his condition had improved considerably.

He went on to say that as a result of the technical success and advances made by the electrical industry, the cost of electricity to light three miles of road was now less than the cost of the electricity used for only one mile at the same intensity 25 years ago.

Mr. J. M. Waldram (G.E.C. Research Laboratories), immediate past president, formally inducted Mr. Carpenter for his second year of presidency, and the president expressed his thanks for members' support. He then introduced Mr. Granville Berry, of Coventry, the first city engineer to be appointed a vice-president of the Association. Mr. Berry, in reply, expressed his conviction that in the years ahead the Association would make an even greater contribution to safety and welfare.

It was announced by Mr. Eric Evans, secretary, that next year's conference would be held at Harrogate from 16th to 19th September. The president then delivered his address which was summarised in our last issue.

Mr. Granville Berry proposed a vote of thanks to the president. He said that he hoped that the country would continue to build motor roads of the type now being constructed in Lancashire, and it was essential that they should be as safe by night as by day. We were only on the fringe of the whole problem of the design of lighting installations and there were considerable developments "just around the corner."

Mr. D. E. Beard (chairman, South Western Section), who seconded, said that there was need for trained and experienced lighting engineers unhampered by restrictions and with imagination and ability to visualise the future.

The exhibition and outdoor display in Upton Valley Gardens, arranged by manufacturers in conjunction with the conference, was opened by the Mayor of Torquay in company with the president.

The platform group at the opening of the conference shown above includes Mr. R. Parker, Mr. L. A. Doxey, Mr. H. C. Brown, Mr. G. Berry, Coun. A. L. Goodrich (Mayor of Torquay), Mr. H. Carpenter (president), Mr. E. Evans, Mr. A. N. Irens, Mr. J. M. Waldram, Mr. E. C. Lennox, Mr. N. Boydell, Mr. C. J. Falk, Mr. J. H. Morrison, Mr. T. M. Lappin, Mr. J. M. Ward, Mr. C. C. Smith, Mr. F. C. Smith, Mr. C. J. Chisholme and Mr. W. T. Souter

Code for Special Traffic Conditions ?

Opening the discussion (on 17th September) of the paper, "Beyond the Code of Practice," by Messrs. H. Hewitt and R. Stevens, Dr. J. W. T. Walsh (chairman of the Code Drafting Panel) said that the super traffic routes to which the paper related were exceptional and he did not agree that there should be a new category in the Code of Practice to cover them. The object of the lighting of these routes was much more a matter of local prestige and local amenity than the facilitating of traffic movement. Rather than devote too much of the available funds to super traffic routes, many of the side roads should be brought up to the standard of the Code.

Mr. L. C. Rettig (Siemens) said that the aim of increasing illumination values for traffic routes was laudable but it could not be achieved by short-cut methods.

Mr. L. R. Osgood (Luton) thought that the Code of Practice was a monument to the skill, courage and foresight of its architects. Stringent experiments should be undertaken before any lighting man committed himself to supporting any large scheme of high-level lighting.

Mr. J. R. Brodie (Ayr) asserted that far too many lighting engineers wanted to be geniuses and to experiment with something special on a main road while side streets possessed antiquated gas lamps. He felt that more official guidance should be given to local authorities to proceed in a proper manner.

Mr. A. W. Christie (D.S.I.R.) suggested that most authorities would require an estimate of the benefits before embarking on the high-powered installations which had been described. On the other hand, the benefits would not be known until sufficient installations had been put up.

Mr. J. Wilson (Paisley) suggested that the heavier

distribution cables to carry the enormous load and the heavy switchgear to handle it represented costs outside the scope of local authorities. The manufacturers of lamps and lighting fittings must co-operate closely to keep costs to the minimum. He believed that, in Scotland anyway, the lamp manufacturers had lost the confidence of public lighting engineers and that the trust placed in them to assist in promoting economic street lighting schemes had been jeopardised by the formation of discount-fixing associations at the expense of the ratepayer.

Mr. P. G. Harrison (Siemens Edison Swan, Ltd.) asserted that many smaller authorities could not afford street lighting to the standard of the existing Code. He asked whether the demand for equipment would be sufficiently great to allow manufacturers to develop and sell it at an attractive price.

Mr. F. H. Pulvermacher (South Wales Electricity Board) feared that in too many instances the man in the street, or members of councils, judged installations by their glare rather than the way they helped visibility. It could be better to have no lighting at all than poor street lighting.

Mr. J. M. Waldram said that the Code of Practice had been a magnificent example of realistic thinking, but practice had now caught up with the Code and it was time that it was re-examined. Britain had led in street lighting practice for 20 years, but was now beginning to be surpassed by other countries which had been freer to go beyond the Code.

Mr. A. W. Gostt (Philips Electrical) said that what was wanted was several go-ahead authorities who would be prepared, perhaps out of local revenue, to take up some of the experimental ideas and put them into practice.

Mr. J. A. C. King (Kuwait) asked to what extent there was justification for paying more money for a service which the general public—ratepayers and taxpayers—might not consider necessary.

Mr. J. G. Christopher (Thorn Electrical Industries, Ltd.) pointed out that quite a few progressive boroughs had already gone beyond the Code of Practice, and so had many cities in other parts of the world.

Mr. R. Stevens, in reply, said that he would favour a new Code of Practice after due experiment. It was true that high-level lighting was installed for prestige reasons, but the lessons obtained from it could be applied to the more utilitarian streets. He stressed the need for experiment; there were many factors yet to be resolved. On a really well lighted street it should not be necessary to use any extraneous aids to visibility. There were many problems, both of technique and supply, but manufacturers were ready to co-operate in reducing specialised commitments and trying out equipment which would help local authorities to improve their street lighting. The need would soon arise, if it did not exist already, for practical trials of various forms of lighting in the overcrowded streets.

Mr. F. C. Smith, M.B.E. (Joint Lighting Committee), proposed a vote of thanks to the authors and Mr. Hewitt, in acknowledgment, emphasised that he and Mr. Stevens had never suggested that the Code was failing in its purpose in providing excellent street lighting over very many miles of road. It was only the specialised roads that were the concern of the paper.

Mrs. Carpenter, the president's wife, entertained the ladies to tea while the above paper was being read.

On Tuesday evening there was a civic reception by the Mayor and Mayoress of Torquay, which was followed by dancing and a cabaret.

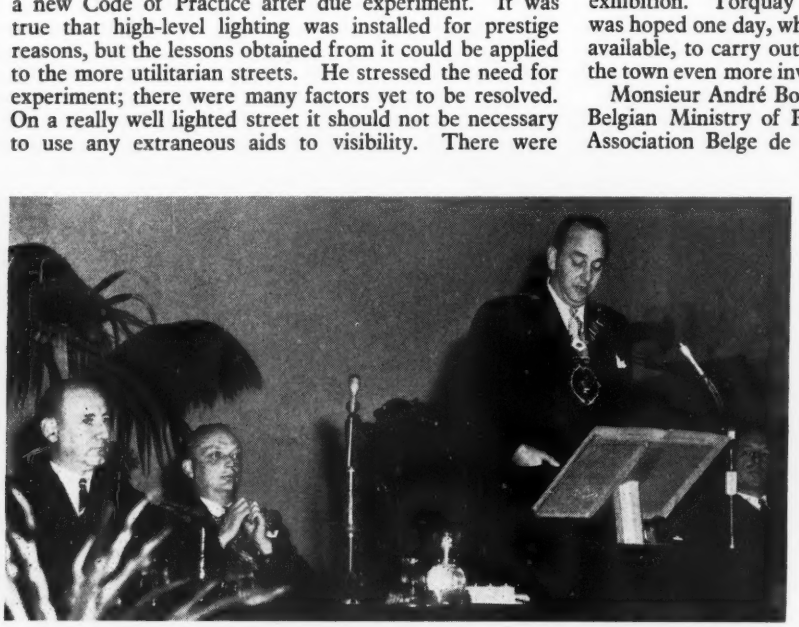
The Wednesday morning session of the conference was devoted to an inspection of the exhibition of street lighting apparatus and the outdoor display of mounted equipment, all of which was surveyed in our last issue.

Annual Luncheon

This was followed by the annual luncheon, at which " The Borough of Torquay and the Guests " was proposed by Mr. Granville Berry, M.I.C.E., M.I.Mun.E. (vice-president), who, after complimenting the civic authorities upon their town, welcomed especially the Continental guests. He said that, internationally, street lighting to-day was more significant than ever in the past, and the Association was delighted that Dr. Walsh, the president of the International Commission on Illumination, was again present. Other guests were Mr. H. A. R. Binney, director and secretary of the British Standards Institution; Dr. H. F. Gillbe, of the Ministry of Transport and Civil Aviation; Dr. Harper and Mr. G. F. Cole, president and secretary of the Illuminating Engineering Society; and Messrs. J. G. Christopher and W. J. Jones, of the newly-constituted Electric Lamp Industry Council.

The Mayor of Torquay (Councillor A. L. Goodrich, J.P.), who replied, congratulated the organisers of the exhibition. Torquay was proud of its borough and it was hoped one day, when the money became more readily available, to carry out lighting schemes that would make the town even more inviting.

Monsieur André Boereboom (Inspector-General of the Belgian Ministry of Public Works and president of the Association Belge de l'Eclairage Public), who proposed



Mr. H. Carpenter reading his presidential address; Mr. Granville Berry and the Mayor are on his right and Mr. A. N. Irens on his left

Mrs. H. Carpenter, the president's wife, welcomes the guests at her tea party. With her are shown Mrs. Waldram and the Mayoress

the toast " The Association of Public Lighting Engineers," said that his regular visits to the annual conferences of the Association over the past twelve years had resulted in a new Code of Practice being issued in Belgium, where the manufacturers had made a combined effort to improve their products and to market them in the spirit of fair play which he always admired in Britain. The Association had served as a model for the recently-formed Association Belge d'Eclairage Public. In Belgium, added M. Boereboom, electricity supplied for public lighting had increased by more than 300 per cent in less than ten years and a still bigger increase might be expected in the future.

The president, in responding, said that the service of public lighting was undoubtedly international and not merely national in character. The Association was now entering its 34th year, and having expanded on the firm foundations of the early public lighting enthusiasts and pioneers who founded it, the A.P.L.E. looked forward to even greater activities.

Mr. Carpenter expressed surprise that far more towns did not make the effort to turn their parks, cliffs and other places into additional night-time attractions by the use of artistic, decorative lighting as Torquay had done.

The Association was fortunate in having energetic and imaginative representation from all branches of public lighting — research and design, manufacturers, sales engineers, lighting authority engineers and municipal engineers. It was glad to invite the local lighting authority representatives to its conferences and meetings to keep them abreast of modern developments and to obtain the benefit of their views. The number of delegates to the annual conference was increasing every year. This year, there were about 1,200 delegates and about 500 representatives and ladies.

In the afternoon there was a showing of films representative of various aspects of public lighting, and while this was going on the ladies enjoyed a coach tour of the Devonshire countryside, and took tea at Ashburton.

Street Lighting Performance

Mr. W. R. Stevens, B.Sc. (G.E.C. Research Laboratories, and past-president, Illuminating Engineering Society), in opening the discussion on the paper " Relative Importance of the Variables Controlling Street Lighting Performance " by Messrs. H. R. Ruff and G. K. Lambert on Thursday morning, described the paper as an interesting attempt to put a figure of merit on the many factors in order to appraise the street lighting installation, but said it was no simple problem. The authors had been enabled to make their attack on it by the advent of the electronic computer.

Mr. J. A. C. King (Kuwait Electricity Department) said the authors appeared to have found out exactly why the ordinary high-pressure mercury lamp was a nuisance from the viewpoint of glare. A bugbear more permanent than rain in Kuwait was the dust that stuck to the perspex of the lantern bowls, and he pleaded for the chemists to provide a perspex which did not collect static.

Mr. A. J. Harris (Road Research Laboratory) suggested that the advent of the computer might make possible lighting computations of which people had always been afraid or which had had to be abandoned at an early and elementary stage. It was dangerous to use averages when dealing with street lighting. It was the darker places on the road that were dangerous, and it might be better to take the minimum low brightness more seriously into account.

Mr. A. W. Christie (Road Research Laboratory) said that the paper showed the average value of veiling glare to be as high as the average brightness of some of the road surfaces which were in common use and a good deal

At the civic reception : the Deputy Mayor (Councillor Milford), Mrs. Granville Berry, Mrs. Milford, Mr. Berry, Mrs. Carpenter, the president, the Mayoress and the Mayor

The group shown in the accompanying photograph, taken at the civic reception, includes members of the new Lighting Equipment Development Council. It shows in the rear Mr. J. I. Bernard and Mr. W. T. F. Souter and seated Mr. J. G. Christopher, Mrs. Souter, Mrs. Christopher, Mrs. Bernard and Mr. W. J. Jones

greater than the brightness of the darker points of the road.

Mr. L. R. Osgood (Luton) expressed the hope that tables would be made available which the ordinary man could use, based on the computations of the authors, so that it would be possible to determine exactly what the glare would be for any particular texture of road.

Mr. F. C. Smith (Joint Lighting Committee) said the authors had extended the use of the statistical method to street lighting practice in a way which had made this powerful weapon, when carefully used, a great help in these problems.

Mr. C. C. Smith (Liverpool City Council) said it was gratifying to see that veiling glare, which could be regarded as the more serious of the two types of glare, was far less effective in the case of the colour installation. The elimination of glare of any kind, and particularly veiling glare, was one of the greatest single factors towards good revealing power.

Mr. G. K. Lambert, replying to the discussion, explained that the paper was offered as a preliminary indication of the possible uses of the computer and was far from giving the final answer. To aid in condensing the vast amount of information already obtained, the authors had adopted, rather reluctantly, the expedient of presenting curves of averages, but they were no more happy about this method than those who had criticised it in the discussion.

The computer had been in the possession of the authors only a short time and they had not really fully digested the results, but tables should become available in the future. The popular Press had often spoken of the computer as an electronic brain, but the brain was first that of the devisers of the machine, and then that of the man who did the programming.

Mr. H. R. Ruff added that the reason why the peaks were symmetrical under the cut-off lantern and not under the medium-angle beam was that the cut-off lantern was ahead of the "T" beam and under every lantern there was almost the same impulsion of brightness at the approach.

Harmony with Local Conditions

The discussion on the paper "The External Scene" by Messrs. Bicknell and Grundy on Thursday afternoon, was opened by Mr. Curzon Harper (borough engineer, Barking) who said the authors had drawn attention to the need for a more imaginative approach. He liked the renewed interest in the variation of lighting to suit prevailing conditions. He emphasised the very costly and most valuable research work undertaken by the industry and suggested to the elected representatives of local authorities that they could help to finance it by trying always to accept the best tender, which was not necessarily the lowest.

Dr. H. H. Ballin (Thorn Electrical Industries) showed some illustrations of the *Son et Lumiere* display at Woburn Abbey which, he declared, gave an idea of the possibilities of imaginative lighting which would attract the people and which, he claimed, adequately met the desire of the authors to "arouse and stimulate a sense of civic pride."

Mr. Howard Long agreed with the authors that when the factory regulations were formulated, higher values were adopted. He saw no reason why the same should not be done in this sphere. If the paper suggested that more restrictions were wanted, however, the answer was that there were too many already.

Mr. J. A. C. King supplemented the authors' illustrations by showing slides of installations in Kuwait, including photographs of the blazing oilfield gas which had to be disposed of. As lighting, he said, it was effective, but nobody in the country would have enough money to pay for it as gas.

Mounting Heights

Mr. J. R. Brodie (Royal Burgh of Ayr) opposed any proposal to depart from the present mounting heights of 15 and 25ft.

Mr. J. C. Cotton (Portsmouth City Council) described how the painting of columns added gaiety and life to a street.

Mr. J. T. Grundy, in reply, said that his only criticism concerning the Woburn Abbey illustrations was that it was time that some lighting was done in Woburn to enable one to find the Abbey after dark. The paper did not advocate restrictions but said that control of shop window lighting was preferable to the possibility of accidents being caused by bad practice. The question of intermediate heights was a controversial one. His own feeling was that as time went on more by-pass roads would be built, with a consequent reduction in the traffic stream through towns, and more attention should be paid to the desires of the residents. He paid a personal tribute to his co-author, Mr. Bicknell.

Mr. N. Boydell (South Eastern Electricity Board), in moving a vote of thanks to the authors, said that if by their paper they had drawn attention to the fact that lighting of all kinds was fast developing without real and general control or correlation, and that one day, unless something was soon done about it, the lighted scene and the appearance of the equipment by day-time would be ugly, garish and harmful instead of being an enhancement of that scene, they would have done a very good job.

The remedy was not simple but must be broad and far-sighted and far beyond even the most omniscient individual.

Bridge and Tunnel Lighting

The paper entitled "The Lighting of Bridges and Tunnels" by Messrs. C. C. Smith and J. M. Waldram, was read and discussed last Friday.

Mr. A. W. Gostt (Philips Electrical), the opening speaker, said that the lighting of bridges to reveal architectural features relieved the monotony for drivers at night on trunk roads where there was no street lighting and it also provided landmarks. He described the new Velsen tunnel, in Holland, among the new features of which were concrete visors over the entrances. It was shaped with sloping sides towards the roadway, the top portion was painted dark blue and the sides light green, and the illumination was by fluorescent lamps let into the ceiling.

Monsieur André Boereboom (Ministry of Public Works, Belgium) agreed that bridge lighting by a continuous line of lamps from the handrail was unusual and costly, but from its experience of the first of these installations Belgium had found a way of avoiding practically all the glare by using special louvres which were black at the upper side and brilliant underneath. The lighting distribution had also been improved so that there was more light at the centre of the bridge and rather less on the footpath.

Mr. R. S. Hazell (Revo Electric Co.) mentioned that the height of the lighting fittings in Blackwall Tunnel was limited to 8ft 6in, for maintenance purposes. In Rotherhithe Tunnel it had been possible to increase the height of the fittings above the footway and also to use a stock pattern of lighting unit, and the shallow Class B lighting unit was used.

Mr. G. V. Harrap (South Eastern Electricity Board) said that the new Dartford-Purfleet Tunnel would have both advantages and serious disadvantages from a lighting point of view. Its alignment was almost due north and south, and the contrast in illumination at the south end in particular would be probably the highest ever to be experienced in the country. There were no trees nor buildings to break the intensity of the sunlight. The initial entrance lighting must therefore be extremely high. Variations in lighting should be practicable, because the ventilating plant control room would be manned 24 hours a day and the same personnel could deal with the lighting. Mr. Harrap suggested that some of the proposals in the paper could well be applied to the "rather nasty and dangerous situations" to be found in old tunnels under railways and canals, more particularly in northern industrial areas, some of which were still lit by old, flickering gas lamps.

Mr. A. J. Harris (Road Research Laboratory) suggested that the avoidance of the use of specular reflection in the old days, when lamps in tunnels were further apart than they were now, did not necessarily mean that one had to be so afraid of it now.

Mr. J. A. C. King (Kuwait) said that the night approach to tunnels appeared sometimes to have been overlooked, apart from the two or three tunnels where the lighting could do with improvement in general terms. He wondered whether the effect of haze would be serious in any long tunnels of the future, such as a Channel tunnel. In a 20-mile tunnel it might be like "driving through a wall" in the middle, and he did not think that lighting engineers would be able to do very much about it.

Mr. J. H. Morrison (Bolton Borough Council) said that the trouble in the lighting of hills and humps on roads was that in the horizontal plane of the light sources the main beam never reached the road surface to oncoming traffic, the reason being that the driver was getting direct vision. Was it not possible to have a fitting in which the light could be set off at an angle parallel to the road surface?

Mr. C. C. Smith, replying, emphasised the close collaboration that was necessary between all concerned in the designing and building of tunnels. The cost of the bridge handrail installation quoted in the paper was about £33,000, against £700 for the equivalent normal sodium installation. This was what it cost to please the architects.

Tunnels were built to endure for a considerable period, and one had to think in terms of flexibility and of being able to improve, modernise or modify any lighting that might go into them. This seemed to have been done effectively in the case of Blackwall and Rotherhithe Tunnels. The existing Mersey Tunnel fittings were comparatively small. The builders, however, did not want to cut into the wall to recess bigger fittings, and the roof maintenance people were against projections. This imposed considerable limitations on any new design. In any long-distance tunnel, such as a Channel tunnel, ventilation problems might dictate that the internal combustion engine would not proceed through the tunnel under its own power.

In traffic route lighting, there were great possibilities in increasing the mounting heights, and Mr. Smith thought there was no doubt that trunk roads would in future be lighted from a greater height.

Mr. Granville Berry, vice-president, in proposing a vote of thanks to the authors, paid tribute to Mr. Waldram for his extensive research work, for which he had not only a national but an international reputation, and to Mr. Smith for the practical way in which he applied the results.

Value of Technical Sessions

In closing the conference on Friday last, the president, Mr. H. Carpenter, said that the technical sessions had been most instructive and should have appreciably broadened delegates' outlook and stimulated their thoughts. Certainly, the important problem of lighting the roads should benefit and the present-day techniques—in particular, the mounting heights of Group A and Group B lighting, and so on—would be the subject of careful investigation.

Mr. Carpenter thanked all those who had contributed to the success of the thirtieth annual conference, including the manufacturers for their excellent exhibition of modern lighting equipment.

Mr. Granville Berry voiced the thanks of the delegates to the president and the conference was closed by the Mayor of Torquay.

British Plastics Exhibition's New Title

THE next British Plastics Exhibition and Convention, to be held at Olympia, London, from 17th to 27th June, 1959, is to be renamed the International Plastics Exhibition and Convention. The fifth event of its kind, and the second to show international exhibits, it will again be organised by *British Plastics* with the support of the British Plastics Federation. Of the 90,000 people who attended the 1957 Exhibition, 6,000 were from overseas, representing 84 different countries. Full details may be obtained from the organisers, *British Plastics*, Dorset House, Stamford Street, London, S.E.1.

Letter to the Editor

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents

Block Storage Heaters

I THINK it is a pity that Mr. Green, in his letter appealing for the elimination of purchase tax on block storage heaters in domestic premises (*Electrical Review*, 13th September), made the statement, when referring to thermal storage blocks, that " it is generally recognised as the most efficient and economical way of heating buildings."

In view of the fact that there have been no real tests of block storage heating in comparison with other forms of electric heating, surely Mr. Green's claim is a little extravagant. I would, for example, claim that a properly designed system of oil-filled electric radiators " tailored " if possible to the full width of windows and under thermostatic and time switch control, would use less electricity than block storage heaters. Furthermore, under time switch control, they could be switched off during peaks without detriment to the comfort standards of the occupants of the room or building in question.

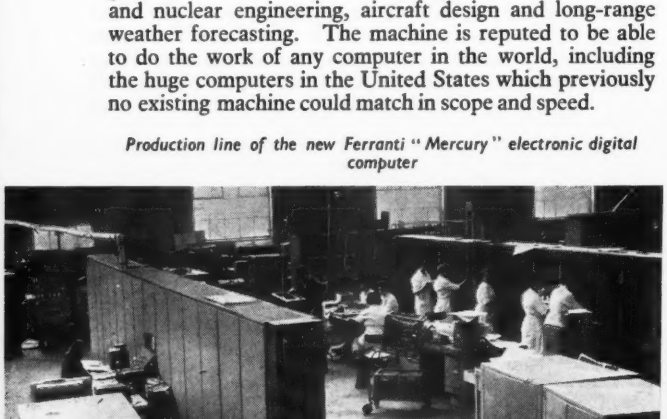
Mr. Green's final request is " Why should block storage heaters be the sole exception ? " Surely he knows that all equipment designed for electric domestic heating, unfortunately, carries purchase tax. If Mr. Green would make a plea for the complete elimination of purchase tax on electric heating equipment, then he would get the support of all manufacturers of this equipment.

London, W.1. A. C. HAZEL,
Managing Director,
Hurseal, Ltd.

New " Electronic Brain "

AN " electronic brain " which can solve problems up to fifty times faster than any computer made in Western Europe has recently been introduced by Ferranti, Ltd., West Gorton, Manchester, 12. Known as " Mercury," it will be used on large-scale problems connected with guided missile control and interception, atomic research and nuclear engineering, aircraft design and long-range weather forecasting. The machine is reputed to be able to do the work of any computer in the world, including the huge computers in the United States which previously no existing machine could match in scope and speed.

Production line of the new Ferranti " Mercury " electronic digital computer



At Harwell, " Mercury " will be put to work on problems of reactor design necessary to help Britain keep in the forefront of atomic energy research. It employs the " floating point " system of number representation which means that the range of the answer does not have to be anticipated. It is the only " floating point " computer of this capacity in Western Europe and opens up an enormous range of possible calculations at higher large-scale research level.

Power consumption is approximately 40 kVA, the figure varying according to the ancillary equipment used. A further 15 kVA is required for the refrigeration system. Heat is finally exhausted by evaporative condenser or water cooling.

The dimensions of the equipment are as follows:—Computer: 31ft 9in by 1ft 4in by 6ft 4in high, with a platform along one side. Desk: 6ft by 2ft 10in by 2ft 7in high. Magnetic drum units: 2ft 9in by 2ft 3in by 5ft 3in high. Power supply cabinet: 6ft 10in by 2ft 2in by 6ft 6in high.

The " Mercury " computer consists of three bays or cabinets which can be set to form a " U " or " L." It costs about £100,000 including installation and initial maintenance, and by the end of this year it is planned to produce one every six weeks. Delivery time at present is about twelve months.

Interest in Floor Heating

IN his annual report for the year ended 15th May Mr. R. Meldrum, burgh engineer of Kirkcaldy, says: " Perhaps the most outstanding happening in the year just finished is the tremendous interest created throughout the country in our experiments in all-electric houses, particularly in the matter of electric floor heating." Some forty English housing authorities had sent deputations to Kirkcaldy to inquire into the efficiency and economy of the system and the reactions of the tenants. As a result of the work done in Kirkcaldy, a number of English cities, including London, Birmingham and Wolverhampton, were proceeding with electric floor warming.

The reasons for " this sudden interest " in the Kirkcaldy flats, Mr. Meldrum deduces, were that the general needs subsidy was withdrawn entirely in England, thereby forcing the English councils to proceed with central area redevelopment often involving high flats for which a slum clearance subsidy was payable; that at the same time as subsidies were withdrawn, the Government passed the Clean Air Act which would eventually make it an offence to discharge smoke from chimneys; and that the Suez Canal incident demonstrated at the same time " how little we can afford to rely on imported fuel, such as oil, for large-scale housing development."

The three things had occurred simultaneously with the completion of the first year of occupation of Kirkcaldy's Valley Gardens flats when the actual running costs indicated that no other form of fuel could better electricity for cheapness in costs to the housing tenant. The second year's running costs of the flats were now available and it was thought worth while to record these actual average weekly costs:—First year, three-apartment flat, 14s 3½d; two-apartment flat, 10s 9½d; second year, three-apartment flat, 13s 7½d; two-apartment flat, 9s 4d. Mr. Meldrum explained that these were average costs including house heating, water heating, cooking, lighting, radio, etc. There was a wide variation in the bills of the various tenants above and below these average costs. The Council had now 249 all-electric houses and had authorised 300 more.

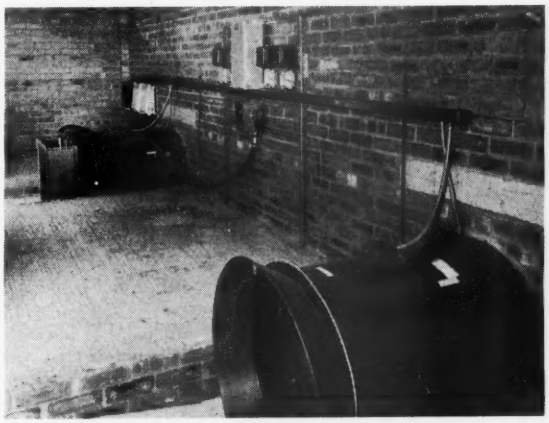
Electrical Methods of Green Crop Drying

By W. L. HEARLE, A.M.I.E.E., A.M.I.B.A.E.*

Opportunities for Substantial Increase in Farm Load and Revenue

IT has for some time generally been recognised that the capital invested in rural electrification is most unlikely ever to provide an economic return, unless there is a considerable increase in the use of electricity in rural areas and in particular on farms. The average consumption on the 172,500 farms connected at 31st March, 1956, in England and Wales was 5,720 kWh per annum, which provides a revenue per farm of £36 to cover cost of supplying energy, line and transformer losses, depreciation, rates, rent, etc., and interest on capital.

With connection costs now in the £400 to £600 per farm category, it is obvious that these revenues are well below that required to provide an economic return and certainly not sufficient to recover any capital invested. This average figure of £36 per annum from farm supplies would need to be over £100 per annum before it could be said that farm connections were self supporting.



Equipment for typical two-bay dryer with two axial flow fans and movable heater

There is, of course, plenty of evidence to show that many of the more productive farms can profitably consume electrical energy to the total of £200 or £300 per annum. Some excellent examples of this have been put forward from time to time which makes it a little hard to understand why the average is as low as £36 per annum. It is probably the large number of farms which take supply for domestic purposes only which keeps this average down.

It has been stated from time to time, and rightly so, that if farmers profess to want electricity supply for their business, they should be prepared to make fuller use of it. However, no amount of exhortation on these lines will have any real effect. In the first place, the farmer's first need for electricity is for its convenience and amenity value rather than a business asset. He uses it for machinery or methods, if it so happens that such machinery or methods economically employ electricity, and not for the sake of using electricity in itself. This is where, in the author's opinion, publicity towards further use of electricity on farms needs a more direct approach, publicising the equipment or the method and its economic value rather than the medium by which it is used.

Obviously, the quickest way to increasing the use of electricity on farms is by selling the equipment which uses it, and whether this be the prerogative of electrical contractors, agricultural implement dealers, or the Electricity Boards themselves, it is quite certain that the selling of such equipment involves a greater amount of time, effort and specialised knowledge than that normally associated with domestic electrical appliances. If the objective is to be achieved more consideration needs to be given to the employment of specialist sales staff in the more prosperous agricultural districts of the British Isles. The load will certainly not develop unless it is actively sold by well-trained staff and the training schemes sponsored by the E.D.A. can help in this.

Whatever methods are used to increase profitable revenue from farm load, no one would deny that such load should, if possible, be off-peak, and in this connection electrical drying of the grass crop offers probably the greatest scope.

Unlike the cereal crop which is grown only in typically arable farming areas, grass is grown on all but very few of the farms in the British Isles. Although the cereal crop offers good scope for electrical drying, such plant is employed for little more than six weeks of the year.

Of the many improvements effected in crop husbandry and productivity, that associated with the grass crop has received wide attention in recent years, and there is no doubt that grass is now considered to be a crop in its own right. Advance in grass strains and grassland management is now reaching the stage on many farms where it is grown for grazing and conservation over a period from mid-May to mid-October. The days of the optimist farmer who hopes to conserve all his surplus grass in the form of hay during 14 days of fine weather in late June, must soon be numbered and a greater dependence on spreading the risk and the harvest will become more general.

Electrical methods of conserving grass from mid-May to mid-October are attractive loads for electricity and of economical advantage to the progressive farmer.

Valuable work by the Electrical Research Association in recent years has evolved processes of all-electric grass crop drying without the heavy heating loads which might have been envisaged. A development of the cold air barn hay drying system already well established in some parts of the country, particularly in the north, this system is two-stage, using fans for the movement of a high volume of cold air initially and smaller volumes of warmed air for the final stage. The grass is first wilted in the field to a moisture content of 65 per cent or below. Drying is usually on a three-day cycle, two days cold air, one day warm air. Installations of this type in the north-west have involved heating loads of 20 to 36 kW but

* Agricultural Development Engineer, North Western Electricity Board.

36 kW is the exception rather than the rule. In order to improve the electrical load factor and the farm operational load factor, it is obvious that such a system should be something like a continuous process, i.e. loading and unloading of the dryer should take place, if possible, each day of the working week. Such an arrangement is consistent with the small farm labour force usually available and imposes little or no additional overtime or reorganisation, a predominant factor on most farms. In order to achieve the continuous process idea, the system developed by the North Western Electricity Board is such that a given floor area is divided into three smaller drying bays, each with its own fan, and the heater loading is thus reduced by one-third, but the operational load factor of the heater becomes practically 100 per cent. Only one portable heater of some 20 kW is needed, moving from fan to fan.

For the purposes of protection some form of electrical interlock is necessary to ensure that the heater contactor can only be energised when the motor to which the heater is attached is in operation. This can be achieved through a pilot plug and socket arranged at each fan, linking the circuit through the thermal cut-out of the heater with the starter contact of each fan motor.

In order to obtain the required 15/20 deg F temperature rise during the warm blow stage the fan is either baffled down by the appropriate size of air duct heater or a twin motor axial flow fan is used. In some cases a combination of both has been found desirable.

On a farm of only 50 to 100 acres it has now been shown that with the three-bay/three-day drying some 40 to 60 tons can be dried at a total energy cost of £100 to £150 per annum. To the Area Boards such revenue often represents an increase of 300 per cent from individual farms and to the farmer who understands the value of high quality conserved grass it means a considerable reduction in his winter food bill and a prospect of a clean bill of health for his cattle. Such savings and benefits soon offset the usual capital expenditure of £300 to £500 and a running cost of £3 per ton is small in view of the high feeding value of the product. From the national standpoint, dollar imported feeding stuffs are reduced and the money invested in electricity supply to the farm may well show a profit instead of a loss.

At this time when the dairy farmer is being forced to reduce the cost of milk production rather than increase output, this development is significant both to the prosperity of British agriculture and the easing of rural electrification problems. If such utilisation is to become more widespread a greater sales effort will be needed to bring it about, together with a more comprehensive appreciation by the farmer of the economic advantages.

RAILWAY CONTRACTS

REPORT OF INQUIRY INTO ALLEGATIONS

OVER two years ago the British Transport Commission decided to appoint an officer to advise it on supply and production policy and to co-ordinate supply proposals to the appropriate committees of the Commission and co-ordinate inspection and testing policy. Mr. E. L. Gethin, at that time deputy chief contracts officer of the Central Electricity Authority, was selected for the position which he held until 31st May last.

Mr. Gethin had criticised certain aspects of the Commission's purchasing methods and following questions in Parliament the Minister of Transport and Civil Aviation asked Sir Harold Howitt, G.B.E., a distinguished chartered accountant, to inquire into the matter. Sir Harold Howitt's report has now been published as a White Paper (Cmnd. 262, H.M. Stationery Office, 3s).

The report mentions that three specific cases had been referred to by Mr. G. R. Strauss in the House of Commons, dealing respectively with vacuum brake cylinders, signalling and "overhead electrification." Later, a fourth allegation was made concerning the closing of the Brighton Locomotive Works and Sir Harold was asked to include this in his review. Subsequently, further matters were raised including telecommunications cable for the Crewe-Manchester electrification, cables and switchgear for the Kent Coast lines electrification, ancillary services for the Southern Region change of frequency scheme and the purchase of batteries and train-lighting dynamos.

Sir Harold briefly summarises the main features of British Railways' £1,200 million modernisation programme and the financial aspects and he describes the structure of the Commission's organisation. The purchasing and contract procedure before 13th August, 1957, is also outlined. Mr. Gethin was appointed to a committee charged with the task of reviewing the whole supplies organisation. The committee produced a report in October, 1956; it was finally approved by the Commission in May last and a "directive" implementing the proposals was issued on 13th August. This provided for the abolition of the post of supplies and production adviser and the absorption of the existing stores department by the supplies and contracts departments. It was stated to be the Commission's policy to obtain supplies and works by competitive tendering although it was recognised that circumstances might dictate departure from this policy or make it impracticable.

The chief contracts officer was to prepare codes of contract procedure. The engineering or user departments concerned were to prepare specifications and recommended tender lists for works contracts and the chief supplies officer for other central purchases, to be submitted to the chief contracts officer. Among other matters a standardisation officer was to be appointed to accelerate the standardisation of components and specifications.

Mr. Gethin was given a copy of the directive (after he had left the Commission's service) and he made several criticisms which are summarised in the report. Mr. Gethin thinks that the need for a supplies and production adviser remains; he would co-ordinate and advise the supplies, contracts and production departments which would introduce an "element of healthy competition" between production in the workshops and purchases from industry. He is of the opinion that an engineering officer is more concerned with technical standards than cost and considers that approval of departures from competitive tendering

has been too easily given in the past. The inadequacy of the present progressing procedures, referred to by the committee, is not remedied by the directive. All regions should operate a common system for the control of stocks; this would allow full advantage to be taken of standardisation.

In his findings Sir Harold Howitt says that the chairman of the Commission (Sir Brian Robertson), referring to the abolition of the post of supplies and production adviser, has assured him that disputes over any particular issues will be dealt with at the highest level. Sir Harold believes, however, that there should be a production officer at central staff level to supervise production in the railway workshops and co-ordinate it with outside purchases. He is inclined to favour the Commission's proposal to appoint a principal progressing officer instead of leaving progressing to the regions.

Upon the subject of competitive tendering Sir Harold shows that in 1956 of a total of £62·6 million of works and equipment orders placed and contracts authorised £26 million was on a competitive basis, £12·3 million "association, including negotiated or list prices," £14·3 million non-competitive and there was an overhead electrification contract of £10 million. Purchases of stores and contracts concluded at headquarters, excluding solid fuel, totalled £57·3 million of which £23·5 million were competitive, £25 million "association, including negotiated or list prices" and £8·8 million non-competitive. For six months of 1957 the total for works and equipment was £67·1 million, of which £48·2 million was competitive, £1·5 million "association" and £17·4 million non-competitive.

The figures show that the departure from competitive tendering is "not inconsiderable" which stresses the need to take every practicable safeguard, especially during the execution of the modernisation programme. Examination of a random selection of supply items to ascertain the method and extent of competitive tendering showed that in such cases the method of selecting firms to tender was reasonable and the contracts were fairly awarded to the supplier offering the most attractive quotations. The only examples of tendering for works and equipment examined were those covered by specific allegations.

Substantial reductions in the number of components and specifications have already been achieved by standardisation and the work is proceeding.

Sir Harold Howitt next examines in detail the specific allegations made and we select from the report the matters of electrical interest.

Signalling Contracts

Mr. Gethin had stated that the Commission's signalling contracts were allocated to three contractors without financial safeguards on a lump sum basis. The contractors are the Westinghouse Brake & Signal Co., Ltd., the Siemens & General Electric Railway Signal Co., Ltd., and Metropolitan-Vickers-G.R.S., Ltd. The amount of work involved in signalling under the modernisation plan is valued at about £88 million. Contracts accepted or tenders received but not yet approved by the Commission amount to £10·6 million (£10·2 million on a non-competitive basis) and the Commission itself is to carry out work to the value of £5·4 million.

Contract procedure is described and it is mentioned that Mr. Gethin's criticism was that the railway signal engineers had insufficient time to carry out extensive surveys and there was no fair basis on which to make detailed comparisons of costs with the contractors' tenders.

Sir Harold points out that the decision to employ (with Mr. Gethin's approval) the three firms and ask them for non-competitive tenders was done to ensure the full use of the available capacity of the country—in signalling engineers and production facilities. He is advised that some breakdown of the contracts into a tender basis, as suggested by Mr. Gethin, might be possible, but he is not convinced that the result would be any more satisfactory than the existing checks.

Overhead Electrification

In the matter of overhead electrification Mr. Gethin's main allegation was that the contracts which it had been agreed should be placed with the British Insulated Callender's Cables group were without adequate costing safeguards and would establish a virtual monopoly with these companies for the first five years of the modernisation plan, after which their position as compared with other contractors would be impregnable.

The report reviews the extent of the electrification plans and shows that the proposed contracts with the B.I.C.C. group are valued at £10 million. In the negotiations B.I.C.C. indicated that if they were to use their design staff for the preparation of schemes they should be assured of a reasonable level of production and erection work. In January, 1956, the chief electrical engineer recommended that a contract should be negotiated with the group because they alone had experience of the proposed 25 kV a.c. system. Other contractors were given about three weeks in which to submit particulars of their ability to carry out the work and four (including B.I.C.C.) did so; only two were complete in all respects. The B.I.C.C. rates of profit were, so far as could be judged, comparable with those in the other tenders. In June last, to introduce competition, the erection contract for the Glasgow scheme (£1·5 million) was awarded to Pirelli-General as the only concern, apart from B.I.C.C., with the facilities for drawing copper wire and eventually for manufacturing fittings.

Sir Harold Howitt says that hoping to secure some of the electrification work the B.I.C.C. and other contractors made contacts abroad, particularly with the French. There was never any thought of engaging overseas contractors or buying their components (except a few specialised items) but steps were taken to get their co-operation and "know how." He thinks that three weeks was a short period for reasoned replies to the call for particulars and in fact the replies were not finally considered until two months after the closing date. It was "natural and right" that the B.I.C.C. should obtain the design contract because of their previous experience and the B.I.C.C. were entitled to couple with their contract for designs a demand for a share of the supply of components and of erection. Sir Harold gathers that considerable bargaining has taken place and does not doubt that the Commission secured the best terms it could.

The general view (even among the unsuccessful contractors) was that "cost plus," with all its known disadvantages, was the only basis for the pilot scheme contracts. He is satisfied that the B.I.C.C. are working in the closest co-operation with the Commission's representatives and he cannot therefore accept Mr. Gethin's contention that there are not adequate costing safeguards.

In connection with the telecommunications cable for the Crewe-Manchester electrification Mr. Gethin alleged that the submission by the Region to the Works and Equipment Committee was in some material respects incomplete or inaccurate.

Of three tenders received specifying aluminium sheathing (believed to be the most effective screening against induced voltages) one from contractor "A" quoted

protracted deliveries although the tender was competitive and technically acceptable; contractor "C" was unable to guarantee the desired degree of screening; contractor "B's" special finish was considered to be the best practicable protection against corrosion and was recommended for acceptance. Later, contractor "A" revised the delivery date. There was much discussion within the Commission but the contract was finally awarded to "B."

Sir Harold says it is admitted that the Works and Equipment Committee was not in possession of full data when making its decision. The Commission says that even with the full facts in its possession it would probably have made the same decision. This raises the question as to the extent to which the Commission and its committees can delegate their responsibilities. Sir Harold thinks that there was an error of judgment in this instance. Revised tenders received after the closing date should be ignored unless they indicate a substantial saving when, if time permits, second tenders should be invited from all contractors concerned.

Mr. Gethin stated that it was originally proposed to give the cable contract for part of the extension of electrification over the Kent Coast lines to one contractor without competitive tendering. Following comments by Mr. Gethin competitive tenders were invited and the contract was granted to a firm quoting £35,784 less than the original contractor and £135,358 less than the estimate of Commission officials. He also alleged that switchgear contracts were granted without competitive tendering to two firms who had been engaged in the Southern Region change of frequency scheme; the possibility of achieving considerable economies by the use of outdoor switchgear was not explored.

After detailing the circumstances, Sir Harold says that while the Commission's technical staff would have preferred the cable contract to go to the contractor with whom they had been dealing on the change of frequency scheme, as a result of tendering that contractor did not receive it. The tenders show that while members of the Mains Cables Manufacturers' Association quote identical prices for cables there is an element of competition in the prices quoted for laying them.

It is felt that the assurances regarding prices which, on the instructions of the Works and Equipment Committee, the electrical officers were to attempt to obtain from the contractors should have been sought in the early stages of the negotiations. Sir Harold is satisfied, upon independent advice, that the decision to use indoor switchgear was properly made.

Change of Frequency Scheme

It was also alleged by Mr. Gethin that a contract was granted without competitive tendering to a member of the M.C.M.A. for the supply and delivery of cables and the provision of cable routes for ancillary services to the Southern Region change of frequency scheme.

The evidence showed that the contractor concerned had already received the main cable contract (£3·5 million) and that work was begun on the ancillary contract four months before it was approved. Sir Harold deprecates the latter, but says that for 40 per cent of the cable competitive tendering would not have affected the price. Although a lower price might have been obtained for the remainder there were no doubt advantages in employing the contractor already on the spot.

Mr. Gethin stated that in several cases contracts for batteries and train-lighting dynamos had bee placed with a particular contractor against sole invitations.

Sir Harold says that in the case of batteries there was no financial disadvantage to the Commission in placing part of its outside purchases with the contractor who quoted Association prices although not a member of the Association. As regards the dynamos the decision to buy from the contractor was made on technical grounds which appear to be reasonable.

In his summary and conclusions Sir Harold Howitt says that Mr. Gethin's criticisms include points of substance concerning matters which he had been appointed to watch. Some of the criticisms were sound and no doubt his point of view, whether or not pressed too far on occasion, was helpful and has had its effect for good on the procedures of the Commission. At the same time Sir Harold thinks that some of his comments failed to allow sufficiently for the practical difficulties and some of his statements went too far.

Referring to the size and the phasing of the modernisation proposals, the limits of the capacity of the contractors and the obligation on the Commission to complete its task in a defined and short period, Sir Harold says that on occasion normal procedure may have to be relaxed and a certain risk taken.

While findings on the specific cases in the report are essentially matters of opinion he is satisfied that in the major cases the decisions were taken at Commission level with all the conflicting points of view properly presented. There was no reason to think that the decisions were, in the circumstances, incorrect. He concludes with some comments on purchasing procedure in general.

Part II of the White Paper is a report by Sir Brian Robertson to the Minister of Transport on the Commission's purchasing policy. In the course of this Sir Brian says:—"Competitive tendering is our firm policy but we must, to save time, rely on design and construction contracts to fill in the present gap in our technical resources." There are various appendices giving further details of some of the matters covered by the report.

BOOKS RECEIVED

Generation, Transmission and Utilisation of Electrical Power. By A. T. Starr, M.A., Ph.D., M.I.E.E. Pp. 529; figs. Sir Isaac Pitman & Sons, Ltd., Pitman House, Parker Street, Kingsway, London, W.C.2. Price 27s 6d.

Guide to Broadcasting Stations, 1957-58. Compiled by the staff of *Wireless World*. Pp. 80. Published for *Wireless World* by Iliffe & Sons, Ltd., Dorset House, Stamford Street, London, S.E.1. Price 2s 6d.

Transistor A.F. Amplifiers. By D. D. Jones, M.Sc., D.I.C., and R. A. Hilbourne, B.Sc. Pp. 152; figs. Published for *Wireless World* by Iliffe & Sons, Ltd. Price 21s.

Telecommunications—An Introductory Textbook for Engineering Students. By W. Fraser, B.Sc.(Eng.), A.M.I.E.E. Pp. 772; figs. MacDonald & Co. (Publishers), Ltd., 16, Maddox Street, London, W.1. Price 65s.

Electrical Engineering Circuits. By H. H. Skilling. Pp. 724; figs. John Wiley book. Chapman & Hall, Ltd., 37, Essex Streeet, London, W.C.2. Price 70s.

Electricity and Electronics—Basic. By William B. Steinberg and Walter B. Ford. Pp. 245; figs. The Technical Press, Ltd., 1, Justice Walk, Chelsea, London, S.W.3. Price 38s.

Symposium on Vacuum Technology. Edited by Edmond S. Perry and John H. Durant. Pp. 257; figs. Pergamon Press, 4 & 5, Fitzroy Square, London, W.1. Price 90s.

Standard Handbook for Electrical Engineers. 9th Edition. Editor-in-Chief, A. E. Knowlton. Pp. 2,230; figs. McGraw-Hill Publishing Co., Ltd., McGraw-Hill House, 95, Farringdon Street, London, E.C.4. Price 124s.

VIEWS on the NEWS

By REFLECTOR

SIR ALBERT RICHARDSON, past-president of the Royal Academy, is objecting to some modern concrete lamp posts which have been erected in his home town of Ampthill, Bedfordshire. His protest has taken the form of a large elliptical plaque, which he has attached to a wall of his house, bearing the inscription:—

"These incongruous lamp posts which detract from the beauty of this historic town were erected by the Urban District Council against the advice of the Royal Fine Art Commission."

While I can appreciate Sir Albert Richardson's annoyance, I doubt whether his plaque will enhance the beauty or dignity of the town.

* * *

In a description of a popular author's bathroom, a writer in the *Evening Standard* referred to a radio set installed there. The chairman of the Uxbridge Home Safety Committee writes to the paper to point out that in a bathroom a radio set can be as lethal as an electric fire. Unless it is a battery set, of course. There is also some risk in the use in the bathroom of dry shavers operating at full mains voltage, although I believe it is common practice. I cannot recall any fatalities from this cause.

* * *

I have never been too fond of the term "saturation" as applied to the actual proportion of a possible total. A "saturation" of 5 per cent is, to my mind, a mere dampening but that is not the whole of my dislike of the word as now used. It can look slightly ridiculous when, as in the *Edison Electric Bulletin* (New York), it is stated "our electric water heater saturation is 27 per cent and we have an electric dryer saturation of more than 17 per cent."

* * *

My readers may recall that during the war a ban was put on the use of electro-medical and other high-frequency equipment because of the interference it caused to Service radiocommunications. When the Order was made the Home Office stated that it had been proved that interference with radio sets on the ground could be experienced at distances of up to 10 miles, while interference with radio sets in aircraft flying at 10,000ft could be experienced at 50 miles or more. This was recalled to me by a recent occurrence reported by the Post Office. Service aircraft flying over areas so far apart as Devon and Northern Ireland, as well as the Home Counties, reported jamming of their radio-telephone communication with control centres. The Post Office was asked to investigate and made widespread checks of hospital equipment and "radio-type" apparatus in factories and other establishments. Finally, the source was located at a Sussex factory where a h.f. heating system was employed for drying wooden billets. Once discovered the trouble was soon remedied. Generally, such equipment must be well installed and screened for otherwise there would be interminable complaints.

* * *

Occasionally I hear of slowness of action on the part of Electricity Boards, but it seems that Indian electricity supply authorities can be even more deliberate. A letter from a consumers' superintendent published in the *Indian Electrical Contractor* deals with the procedure for altering the records when premises change hands. It says

"In most of the cases requisitions are checked and confirmed within ten days from the day of receipt but confirmation is delayed in some of the cases due to non-compliance with our requirements by the applicants. In this connection, we have to add further that the confirmation of the requisition takes about a fortnight due to inter-departmental procedure for recording the change of name. . . . However, in the case of transfer of meter or meters from the name of the landlord having more than one meter to that of the tenant a new account folio is required to be opened and this takes about a fortnight more."

* * *

Talking about the rapidly-disappearing steam locomotive in Switzerland the *Manchester Guardian* refers to "Steam locomotive enthusiasts who resent the encroachments of the honking diesel and the whining electric train." The writer ought to know, or he can easily find out, that while diesels may "honk," electric trains do not whine.

* * *

Now that there is so much said about "nuclear" submarines the following note from the *Electrical Review* of 30th September, 1887, is of interest as showing how far we have advanced in the past seventy years:—

"The Paris *Figaro* describes a new submarine torpedo boat, impelled by electricity. The boat measures 8½ metres from stem to stern. Its prow is rather rounded, which renders it better able to bear the shock of the waves, but reduces its speed. The motor is a dynamo machine devised by Captain Krebs, which drives a screw of 0·55 metre in diameter. The electric power is obtained from a novel accumulator which is kept a secret, but which contains neither lead nor acid. Twenty kilos of this secondary battery yield 1 horse-power. It is said to furnish on discharging all the charge which it has received. The total weight of the battery is 2 tons. The 132 accumulators, connected in series and distributed in three chests, are placed at the bottom of the hold. The boat attained a constant speed of 6½ knots for 5 hours, with the expenditure of 12 horse-power. . . . The *Figaro* expects that this invention will give France the uncontested sovereignty of the seas."

Mr. T. W. Wilcox

Mr. L. L. Tolley

Mr. J. F. Wright

Mr. E. O. Taylor

Mr. C. M. Stoupe

I.E.E. CENTRE CHAIRMEN

IN our last issue we published the portraits and biographical notes of the chairmen of some of the provincial Centres of the Institution of Electrical Engineers and we now give below particulars of the chairmen of other Centres.

Mr. T. W. Wilcox (*North-Eastern*) is chief electrical engineer of Merz & McLellan, consulting engineers. He commenced his engineering career as an apprentice with the B.T.H. Co. at Willesden in 1930 and in 1935 became the first special switchgear trainee to have short-circuit testing experience at the Switchgear Testing Co., Ltd., Trafford Park. He returned to the B.T.H. Co., Willesden, in 1936 and was appointed as a switchgear design engineer. In 1937 he became section leader in charge of all experimental and testing work on oil, air, and airblast circuit-breakers, and for some years conducted all B.T.H. testing at the Switchgear Testing Co., Manchester. He continued with this work during the war but was also engaged on various wartime activities including land mine and aircraft problems. He was the joint author with Mr. H. E. Cox in 1943 of a paper entitled "The Influence of Resistance Switching on the Design of High Voltage Air-blast Circuit-Breakers" which was awarded a Special Premium by the I.E.E. A second paper with the same co-author followed in 1945.

In 1947 Mr. Wilcox joined Merz & McLellan and after spending about a year in the power station electrical group was transferred to the general electrical engineering group which deals with a wide variety of power station and power system problems. He was made group leader in 1950 and was promoted to chief electrical engineer in 1952. Since 1948 he has served on a number of B.S.I. Committees on switchgear and allied subjects and he has also attended meetings of the I.E.C. in Stresa, Paris, Philadelphia, London and Moscow as a British delegate.

Mr. L. L. Tolley, B.Sc.(Eng.), M.I.E.E. (*South Midland*) is chief regional engineer of the Post Office Midland Region. He was educated at Aldershot County High School and University College, Southampton, and, as an external student, obtained the B.Sc.(Eng.) degree (2nd class honours) of London University. He entered the Post Office Engineering Department in the Research Department in 1924 and in 1938 was appointed to the P.O. Eastern Engineering District (Cambridge). In the following year he became regional engineer, P.O. Home Counties Region, and during the war he was concerned with the maintenance of P.O. engineering plant (exchanges, lines, etc.) in the Home Counties. He took up his present appointment in the Midland Region in 1947.

Mr. J. F. Wright, A.M.I.Mech.E., M.I.E.E. (*Western*) was educated at Ipswich Municipal Secondary School, Ipswich School of Engineering and the West Ham Municipal College. He received his practical training in generation and distribution as a pupil with the Ipswich Corporation Electricity Supply and Transport Department, subsequently becoming junior technical assistant with that undertaking. In 1938 he joined the Central Electricity Board as assistant section engineer in North-East London and left this position in 1939 to become distribution technical assistant with the Swansea Corporation Electricity Department where he became chief technical assistant in 1941 and generation engineer in 1947. He was responsible for the electrical side of two 37·5 MW extensions at Tir John power station, together with considerable modification of the existing installation.

In 1948 Mr. Wright joined the South Wales Electricity Board as engineer for the Central Sub-Area, which position he still holds. He was chairman of the West Wales (Swansea) Sub-Area of the I.E.E. in 1946-47.

Mr. E. O. Taylor, B.Sc., A.C.G.I., D.I.C., M.I.E.E., M.Amer.I.E.E., F.R.S.E. (*Scottish*) is Assistant Professor of Electrical Engineering at Heriot-Watt College, Edinburgh. He was educated at Christ's Hospital, West Horsham, and the City and Guilds College, London, and served an apprenticeship with the British Thomson-Houston Co., Ltd., at Rugby and Willesden. He subsequently obtained experience in the A.C. Machine Design Department of the B.T.H. Co., at Rugby, the Technical Department of the Central Electricity Board, London, and as demonstrator at the City and Guilds College. In 1929 Mr. Taylor was appointed lecturer in electrical engineering at the University of Glasgow, and in the following year became lecturer in electric power at the City and Guilds College, which position he held until 1939. During the war he served in the Technical Department of the Central Electricity Board in London.

Mr. Taylor was president of the Edinburgh Electrical Society in 1946-47 and is the president of the Royal Scottish Society of Arts; he was chairman of the I.E.E. South-East Scotland Sub-Centre for 1954-55. He is the author of a number of works on the distribution and utilisation of electrical energy, and has made visits to the Continent to study hydro-electric power and transmission problems.

Mr. C. M. Stoupe, B.Sc., M.I.E.E. (*Northern Ireland*) was educated at the Royal Belfast Academical Institution and Queen's University, Belfast, and following upon graduation in 1929, took a two-year college apprenticeship course with the Metropolitan-Vickers Electrical Co., Ltd., with whom he continued at the works for a further two years as a junior engineer in the experimental section of the Meter, Instrument and Relay Department.

In 1934 Mr. Stoupe joined the Electricity Board for Northern Ireland in charge of the Meter Department at the time when the Board was engaged in acquiring the numerous small statutory and non-statutory electricity undertakings in its area and changing over the supplies to the grid system. In 1936, as assistant technical engineer, he took over the additional responsibility for the installation and maintenance of switchgear and protective gear on the 66, 11 and 33 kV h.v. system of the Board. He became technical assistant in 1944 and in 1948 he was appointed to his present position of chief technical assistant to the chief engineer, in which position he acts as deputy to the chief engineer in all matters connected with generation, transmission and distribution. Mr. Stoupe has been both hon. treasurer and hon. secretary of the I.E.E. Northern Ireland Sub-Centre and chairman of the Northern Ireland Branch of the Engineers' Guild.

PERSONAL AND SOCIAL

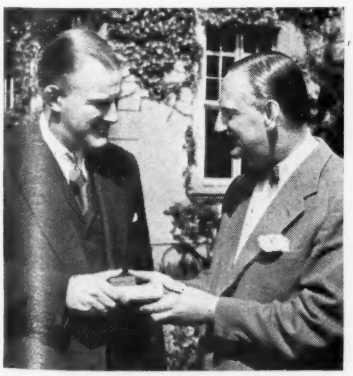
News of Men and Women of the Industry

Mr. F. Murgatroyd, M.Sc.Tech., M.I.E.E., H.M. Electrical Inspector of Factories, is resigning from this position at the end of this month. He was transferred to the northern area with headquarters at Leeds in 1939. His permanent address from 30th September will be Newstead, Nairn Road, Canford Cliffs, Bournemouth.

After 30 years, **Mr. A. E. Iliffe,** director and general sales manager of the Benjamin Electric, Ltd., will be relinquishing his post of general sales manager on 3rd October, but will continue actively with the company as director of sales. As from that date, **Mr. J. O. K. Purdey** has been appointed to the position of general sales manager, and he has resigned his post as assistant manager, Lighting Department, A.E.I. Lamp & Lighting Co., Ltd.

Mr. A. E. Iliffe

Mr. Purdey was recently entertained to a luncheon given by friends and colleagues in the A.E.I. Lamp & Lighting Co., Ltd., when he was presented with a cigar case and cutter as a memento by Mr. C. Phillips, manager of the Lighting Department. After retirement from the regular Army in 1949 with the rank of lieutenant-colonel, Mr. Purdey spent five years with a metal window manufacturing company where he became sales manager. He joined the B.T.H. Lighting Sales Department as a special project engineer for consultants and later became assistant sales manager, Southern region. Shortly after the formation of the A.E.I. Lamp & Lighting Co., Ltd., he was appointed assistant manager, lighting sales.



Mr. J. O. K. Purdey (left) receiving a presentation from Mr. C. Phillips

Dr. M. V. Wilkes, F.R.S., has accepted the invitation of the British Computer Society to become the first president of the Society. Dr. Wilkes is director of the Cambridge University Mathematical Laboratory.

The winter activities of the Society start on 21st October and a programme of meetings has been arranged for the next few months, ending with the annual general meeting and presidential address on 16th June next. Particulars of membership, etc., can be obtained from the secretary of the Society, 29, Bury Street, St. James's, London, S.W.1.

The Northern Aluminium Co., Ltd., has appointed **Mr. E. D. Robinson,** formerly assistant manager of the London area sales office, as area sales manager in charge of the Manchester office in succession to **Mr. D. A. Corbett-Thompson,** who has been appointed sales manager in charge of export sales. **Mr. M. Bridgewater,** who has just completed a year's study at the Centre d'Etudes Industrielles, Geneva, becomes manager of the sales development division, Banbury. He succeeds Mr. E. D. Iliff, who has been appointed sales manager in charge of sales development, advertising and publicity.

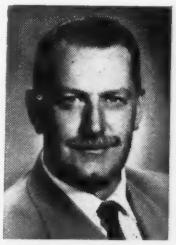
The Metropolitan-Vickers Electrical Co., Ltd., has appointed **Mr. W. C. Clegg,** assistant purchasing agent, to be purchasing agent in succession to **Mr. G. T. King,** who has retired from executive duties. Mr. Clegg joined Metropolitan-Vickers in 1956 as assistant purchasing agent. He was formerly purchasing agent with Ferguson Pailin, Ltd., having joined that company as an apprentice in 1920. Following his apprenticeship and several years in the company's drawing office, he transferred to the sales engineering staff, and in 1940 was made chief estimator. He became purchasing agent in 1945 and retained this position until joining Metropolitan-Vickers.

Mr. W. C. Clegg

Major-General W. A. Lord, C.B., C.B.E., has accepted an invitation to be president of the Junior Institution of Engineers for 1957-58.

The Council of the Institution has made the following awards in respect of papers and lectures delivered during 1956-57:—Institution Gold Medal to Mr. F. J. Haut, of Surrey, for his paper on "Electric Locomotive Design"; Vickers Gold Medal and prize to Mr. R. J. Herbert, of Berkshire, for his paper on "Kinematic Design"; Midland Section Medal to Mr. E. A. Matthews, of Staffordshire, for his paper on "The Last Decade of British Amateur Radio"; and Sheffield Section Medal to Mr. J. L. Faris, of Derbyshire, for his paper on "Some Interesting Safety Devices."

Mr. E. A. Knowles, managing director of F. W. Cave, Ltd., of Auckland, New Zealand, has arrived in London by air. For the last twenty-five years Mr. Knowles has been associated with Mr. Fred Cave of Birmingham and Rugby, who commenced the Auckland company in 1925. F. W. Cave, Ltd., represent the interests of a number of British manufacturers in New Zealand. Mr. Knowles' address while in this country is c/o F. W. Cave, Ltd., 5, Edmund Street, Birmingham, 3.



Mr. E. A. Knowles

The ninth annual students' social of the **Telegraph Construction & Maintenance Co., Ltd.,** and **Submarine Cables, Ltd.,** held at Greenwich Town Hall on 13th September, was attended by over 120 students and their friends. Mr. R. C. Mildner, manager of Telcon's technical and research division, presided and Dr. E. W. Smith, managing director, Cables Group, presented the awards for examination successes. The students were addressed by the Principal of the Woolwich Polytechnic, Dr. H. Heywood.

The Executive Council of the **Association of Supervising Electrical Engineers** announces the following awards of premiums for its 1957 Diploma Scheme examinations:—A.S.E.E. Diploma Examination.—1st Premium, 50 guineas: To be divided equally between Mr. E. F. Cooper, of Twickenham, Middx., and Mr. J. R. Smith, of Bath, Somerset. A.S.E.E. Technician's Certificate Examination.—1st Premium, 10 guineas: Mr. D. B. Salter, of Kenton, Middx. 2nd Premium, 7 guineas: Mr. E. B. Hill, of Sowerby Bridge, Yorks. 3rd Premium, 5 guineas: Mr. W. J. Povey, of Rochester, Kent. The Executive

Council also announces the award of the Albert Brammer Trophy to Mr. D. B. Salter. This silver cup is awarded annually to the member-entrant who obtains the highest number of marks in the A.S.E.E. technician's certificate examination each year. Presentation will be made to the successful candidates by Sir Harold Bishop, president of the Association, at the inaugural address meeting to be held on 29th October at the Institution of Electrical Engineers.

Mr. J. F. Shannon, Ph.D., M.I.Mech.E., has been appointed chief engineer, Gear Engineering Department of the Metropolitan-Vickers Electrical Co., Ltd. **Dr. W. H. Darlington** relinquishes the title of chief engineer, Gas Turbine and Gear Engineering Departments and is now chief engineer, Gas Turbine Engineering Department.

Dr. J. F. Shannon

Dr. Shannon served his apprenticeship with William Beardmore & Co., at their naval construction works, Dalmuir, on marine propulsion machinery. He received his technical training at the Royal Technical College, Glasgow, where he later joined the staff of the Applied Mechanics and Mechanical Engineering Departments. There he was principally engaged on research and investigational work for industrial firms, which led to his being awarded the Ph.D. degree of Glasgow University. At the outbreak of the war he was seconded to the Royal Aircraft Establishment, Farnborough, where he worked on the development of aero gas turbines. Dr. Shannon joined the Metropolitan-Vickers Co. in 1944 as assistant chief engineer, Gas Turbine Engineering Department, and was concerned with the development of aero, naval and industrial gas turbines. He transferred to the Gear Engineering Department in 1956. He serves on a number of Government Committees and is a member of the Institution of Engineers and Shipbuilders in Scotland.

Mr. E. J. Turner, assistant secretary, general administration, Central Electricity Authority headquarters, London, has been appointed secretary of the new Central Electricity Generating Board. Mr. Turner was educated at Cardiff High School for Boys and in 1928 entered the service of Glamorgan County Council. He was admitted a solicitor in 1939 and was then appointed assistant solicitor to the County Council and also assistant county prosecuting solicitor. He served with the 77th (Welsh) Heavy Anti-Aircraft Regiment, R.A., in the last war and was demobilised in 1945 with the rank of lieutenant-colonel, returning to the Glamorgan County Council as senior assistant solicitor and senior assistant county prosecuting solicitor. In 1948 he was appointed first secretary of the South Wales Division of the C.E.A. and held this appointment until 1956, when he came to London as assistant secretary to the Authority. He was national president of the Association of Managerial Electrical Executive for 1954-55 and represented that Association as a member of the National Joint Managerial Committee from 1953 to 1956. Mr. Turner is a member of the Law Society.

Mr. N. R. Macknelly, A.M.I.E.E., has been appointed assistant general manager of C. Maurice Contractors, Ltd., Bishop's Stortford, Herts. Mr. Macknelly was formerly with the Eastern Electricity Board as first assistant district engineer in the Hertford and Bishop's Stortford Districts. Before vesting date he was with the East Anglian Electric Supply Co., at Stowmarket, Suffolk.

At the annual general meeting of Partridge, Wilson & Co., Ltd., held on 17th September, **Mr. J. Annandale,** D.F.C., A.M.I.E.E., who has been with the company for over twenty-five years, latterly as sales manager, was appointed a director of the company.

Mr. J. Annandale

The Minister of Power has appointed **Mr. F. W. Skelcher,** M.I.E.E., M.I.Mech.E., deputy chief engineer (generation and system operation), Central Electricity Authority, to be a member of the Industrial Coal Consumers' Council.

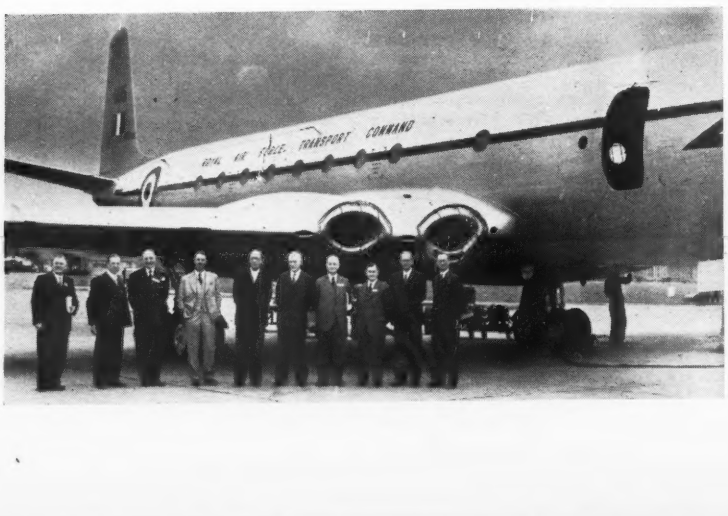
Mr. E. W. B. Thorncroft has been appointed chairman of the Electricity Authority of New South Wales and as a member of the Electricity Commission of New South Wales in succession to the late Mr. V. J. F. Brain. Mr. Thorncroft has been a member of the Electricity Authority since 1947.

Mr. P. Schiller, Dipl.-Ing., M.I.E.E., author of the article on "Tariff Implications" (page 547), is head of the Utilisation Research Section, Commercial Department, of the Central Electricity Authority. He received his technical education at the Vienna Technological University and after war service with the Austrian army from 1914 to 1916 he held various appointments with the Vereinigte Elektrizitäts A.G. of Vienna, the Allgemeine Elektrizitäts Gesellschaft of Berlin, the International Electrical Association (London), and the Electrical Research Association. He joined the British Electricity Authority in June, 1948, on the transfer of the activities of the Electricity Supply Technology Section of the E.R.A. to the Commercial Department of the Authority. Mr. Schiller is the author of several I.E.E. papers, E.R.A. reports and numerous articles contributed to the technical Press.

Mr. P. Schiller

A successful car treasure hunt was arranged by the **Electrical Trades' Commercial Travellers' Association** (Midlands Branch) recently. This was planned along the lanes of Warwickshire and concluded with tea at a country inn. The function was well

Members of the Eastern Electricity Board at Hatfield Aerodrome during their recent visit to the St. Albans District. Left to right: Mr. F. J. Drake (manager, St. Albans District), Sir Stuart Mallinson, Mr. W. Newcome-Baker, Gen. Sir Frank Simpson, and Mr. J. E. N. Davis (part-time members of the Board), Mr. C. T. Melling (chairman), Mr. J. S. Mills (secretary) and Mr. C. C. Hill (manager, Northmet Sub-Area)



attended by members of the Association and their friends. The arrangements were carried out by Messrs. P. J. Kelsey, G. A. James and P. M. King. The winners included Messrs. G. W. Arnold, T. C. Browne and G. Johnson. The Branch annual dinner is to be held at the Pavilion Suite, the County Ground, Edgbaston, Birmingham, on 25th October (6.30 for 7 p.m.). Tickets, 25s each, are obtainable from the hon. social secretary, 26-28, Holloway Head, Birmingham, 1.

Sir Roy Dobson, C.B.E., Hon. F.R.Ae.S., J.P., a director of the Hawker Siddeley Group, Ltd., has been elected deputy chairman of the Brush Group, Ltd.

Lt.-Col. C. P. Dawnay, C.B.E., M.V.O., has been appointed a director of Electric & Musical Industries, Ltd.

Mr. W. L. Hearle, who writes in this issue on "Electrical Methods of Green Crop Drying," was educated at Evesham Grammar School, Queen's College, Taunton, Dursley Technical College and at Bristol University, and he served an electrical and mechanical engineering apprenticeship with R. A. Lister & Co., Ltd. After war service with the Fleet Air Arm, Mr. Hearle joined the Wessex Electricity Co. at Salisbury as agricultural representative, two years later moving to the Western Sub-Area of the South Wales Electricity Board to take up an appointment as agricultural officer. In 1950 he was appointed agricultural development engineer to the North Western Electricity Board. Much of Mr. Hearle's time during this period has been devoted to load development in rural areas and in particular to barn hay drying on farms. This process had been carried through the research stage by Messrs. C. A. Cameron-Brown and P. Finn-Kelcey up to 1950 and since then Mr. Hearle has been mainly instrumental in getting it established on farms in the North of England to the extent that its use is now becoming more widespread in all parts of the country.

Mr. W. L. Hearle

Mr. D. F. Grant, A.M.I.E.E., has been appointed chief generation engineer (operation), North West, Merseyside and North Wales Division of the Central Electricity Authority. He was previously generation engineer (operation) and was responsible for the Merseyside group of stations. After serving an engineering apprenticeship with the Electrical Department of the Associated Portland Cement Manufacturers, Ltd., Mr. Grant entered the electricity supply industry in 1924 as junior engineer with the Loughborough undertaking. Following further experience as technical assistant at Maidstone, he was appointed station superintendent of the Southport power station in 1934, subsequently becoming chief assistant engineer and, finally, deputy borough electrical engineer. At vesting day, he joined the Merseyside and North Wales Division as senior assistant engineer, and was promoted generation engineer (operation) a year later.

The annual function of the Scottish Section of the **Electrical Wholesalers' Federation** will be held at the Marine Hotel, North Berwick, during the week commencing 30th September. The president and Council of the Federation will be there, and a Council meeting, to which the Scottish members are invited, will be held on the Wednesday morning. Members of the Rubber & Thermoplastic Cable Manufacturers' Council and the Electric Lamp Industry Council and their wives have accepted an invitation to attend. Invitations have also been accepted by the presidents of both the National Electrical Contractors' Trading Association and the Electrical Contractors' Association of Scotland, the chairman of the Associated Manufacturers of Electric Wiring Accessories and representatives of other kindred associations. There will be a golf competition on Thursday and a dinner is to be held in the evening.

Mr. H. F. Ford has been appointed manager of the Consumer Products Sales Department of RCA Great Britain, Ltd., in which position he will be responsible to **Mr. W. P. Rowley,** general sales manager.

Mr. G. M. Harvey has been appointed managing director of British Oxygen Wimpey, Ltd. He has relinquished his appointment on the company's board as design manager.

OBITUARY

Mr. A. M. Coombs.—The death occurred on 23rd September at Littlehampton, in his seventy-seventh year, of Mr. Allen Murray Coombs, M.I.E.E.

Mr. Thomas Burrows Nutter, former borough electrical engineer of Burnley, died recently at the age of seventy-five. He joined the Corporation Electricity Department when he left school and was apprenticed to the then electrical engineer. He became deputy electrical engineer and after 20 years in that capacity succeeded **Mr. J. E. Starkie** as head of the department in 1942. Mr. Nutter retired in 1947.

Mr. V. Ashby.—Associated for a number of years with Victor Ashby & Son, Ltd., electrical manufacturers, Towcester, Northants, Mr. Victor Ashby, has died in Northampton General Hospital at the age of sixty-four.

Russian Engineers' Visit

NINE Russian engineers, led by Mr. F. G. Loginov, Chief Deputy of the Ministry of Electric Power Stations, have arrived in Britain this week for a two-week tour of power stations, particularly those of the North of Scotland Hydro-Electric Board. The visit has been arranged by the Soviet Relations Committee of the British Council in collaboration with the Institutions of Civil, Mechanical, and Electrical Engineers. It is a return visit following that paid by six British engineers to Russian hydro-electric installations last May.

The delegation was due to fly to Glasgow yesterday (Thursday) where Mr. A. A. Fulton, general manager of the North of Scotland Hydro-Electric Board, will act as host for an extensive tour of the Board's works. Other visits will be to installations of the Central Electricity Authority, the D.S.I.R. Mechanical Engineering Research Laboratory, East Kilbride, John Brown & Co., Clydebank, Metropolitan-Vickers, Manchester, the Hydraulic Research Laboratory, Wallingford, and Calder Hall.

Valve Makers' Anniversary

THE business of Sir W. H. Bailey & Co., Ltd., was founded in 1832 by a Lancashire engineer, John Bailey, and thus the company this year celebrates its 125th anniversary. Last week a special visit to the Albion Works, Manchester, was arranged when visitors were able to see the range of the company's products—valves of many kinds, test pumps, vacuum pumps, turnstiles, etc.

A souvenir handbook, "A Guide to Valve Practice," has been produced. It contains a history of the business with portraits of the men who built it, views of the company's works, interesting pictures of some of the older products and illustrated particulars of a wide range of valves.

CONSERVATION OF NATURAL RESOURCES

A booklet with the above title has recently been published by the Institution of Civil Engineers, price 7s 6d to members and 17s 6d to the public. It contains seven lectures recently delivered at the Institution by men who have made a study of this particular subject, and who view with alarm the rapid expenditure of resources such as metals, land and fresh water, which increasing industrialisation is bringing about.

B.E.A.M.A. Dinner Cancelled

Owing to the prevailing conditions the Council of the British Electrical and Allied Manufacturers' Association has decided to cancel the annual dinner which was to have been held on 13th November.

INDUSTRIAL NEWS

Capital and Credit

Immediately after the announcement last week that the Bank Rate was to be raised from 5 to 7 per cent the Chancellor of the Exchequer made a statement about the further steps which were being taken to maintain the external and internal value of the pound sterling. It was the aim, he said, to keep national capital investment (including that of the nationalised industries) down to £1,500 million a year for the next two years. This represents a cut of between £300 and £350 million which was the estimated extra expenditure during that period.

Although Mr. Thorneycroft intimated that in the approval of loans and capital issues the sections which contributed most to national production would receive more favourable consideration, it is understood that electricity supply, the railways and mines will all be subject to investment cuts.

Mr. Thorneycroft said that he did not propose to enforce stricter hire-purchase terms or to increase purchase tax. He would rely on the higher interest rates to curb consumption and further inflation.

In a comment on the Chancellor's statement, the Federation of British Industries expressed the hope that within its new limits the Government would favour such productive investment as that in roads, railways and power plants against consumption and administration which to-day were "top heavy." The F.B.I. was encouraged to note that special consideration might be given to export credits.

The British Employers' Confederation foresaw a possibility of some unemployment resulting from cuts in capital expenditure but thought that, given a reasonable attitude, unemployment should not be widespread or prolonged.

Brussels Electrical Conference

Further details are now available of the British Electrical Conference which is to be held on 16th and 17th May next at the Brussels Exhibition. The conference is supported by the British Electrical and Allied Manufacturers' Association, the British Radio Equipment Manufacturers' Association, the Cable Makers' Association, the Electric Light Fittings Association, the Radio Communication and Electronic Engineering Association, the Telecommunication Engineering and Manufacturing Association and the Water-Tube Boilermakers' Association. Sir Vincent de Ferranti is to be the president and there are a number of distinguished vice-presidents. Mr. D. Maxwell Buist is chairman of the Organising Committee and Mr. Sam Black the organising secretary.

Two papers are to be presented—"Communications between Nations and Peoples," by Sir Gordon Radley, director-general of the Post Office, and "Nuclear Energy, the Power of the Future," by Sir John Cockcroft, director of the Harwell Atomic Energy Research Establishment.

Registration forms, obtainable from the organising secretary, 36, Kingsway, London, W.C.2, should be completed and returned by 31st October. The registration fees are five guineas for members and three guineas for ladies accompanying members. Hotel accommodation can be arranged if early indication is given.

Water Strainers for Bradwell Station

F. W. Brackett & Co., Ltd., Colchester, have received an order for fifteen water strainers from C. A. Parsons & Co., Ltd. These twin-strainers are for use at Bradwell atomic power station, and have an aggregate capacity of 1,000,000 gal/hr of sea water, with a low headloss.

South African Import Duties

The *Board of Trade Journal* reports that the South African Board of Trade and Industries has received representations for an increase in duty on three-phase electric motors, from 350 to 1,000 h.p., to 25 per cent *ad valorem* (minimum rate) and 30 per cent (intermediate rate).

New G.E.C. Sheffield Premises

The new branch premises of the General Electric Co., Ltd., in Sheffield were formally opened on 18th September by the Lord Mayor of Sheffield, Alderman A. Ballard. The occasion coincided with the golden jubilee of the G.E.C.'s Sheffield branch, which was opened in 1907. Among those attending the opening ceremony, at Magnet House, Cumberland Street, were Sir Peter Roberts, Bt., M.P., the Master of the Company of Cutlers in Hallamshire, and Mr. Leslie Gamage, vice-chairman and joint managing director of the G.E.C.

The opening of the new Magnet House, planned and constructed in "The Moor" development area, provides the Sheffield branch with up-to-date offices, stores and showrooms, contemporary in design and providing capacity and facilities in keeping with the increasing requirements of serving the Sheffield area. The branch originally opened in some back premises in Sing Hill, Sheffield, with a staff of ten. In 1912 it moved to new premises in Angel Street, which incorporated the first showroom. Expanding business dictated a further move in 1927 to Fitzalan Square.

The new branch premises in Cumberland Street were designed by the company's Constructional Engineer's Department, Wembley. The general contractors were W. G. Robson, Ltd., Sheffield, and the electrical sub-contractors were Hall & Stinson, Ltd., Sheffield. The internal automatic telephone system was installed by the Reliance Telephone Co., Ltd., the goods and service lifts by the Express Lift Co., Ltd., and the neon signs by Claude General Neon Signs, Ltd., all G.E.C. companies. The offices, showrooms and stores are heated by G.E.C. "Nightstor" thermal storage heaters, the dispatch section by overhead radiant heaters, and the radio service section by unit heaters. The manager of the branch is Mr. W. K. Degenhardt.

The new G.E.C. Sheffield premises

Import Duty on Iron and Steel Sheet

Under the Import Duties (Exemptions) (No. 6) Order, 1957, the import duties on a wide range of iron and steel products are suspended until 18th March, 1958, and under the No. 10 Order, 1957, the suspension of duty on almost all plates is prolonged until 18th September, 1958. The Government has decided that the

suspension of duty on most types of cold-reduced sheet of a value of less than £90 per ton should also be prolonged until 18th September next. A new Order, the Import Duties (Exemptions) (No. 12) Order, 1957 (S.I. No. 1625) has been made and will come into operation on 19th March next. The question of further suspension of duty on other iron and steel products after 18th March, 1958, is being examined; an announcement in respect of the duties on these other products will be made in due course.

Lighting Sales Conference

Over 150 representatives from all parts of the country attended the recent annual sales conference of Atlas Lighting, Ltd. The conference, which extended over three days, was held at the Park Hotel, Cardiff, and included a tour of the Atlas lamp factory at Merthyr Tydfil. During the conference dinner on 13th September delegates were addressed by Mr. D. G. Mitchell, president of Sylvania Electric Products, Inc., New York, and Mr. J. Thorn, chairman of Thorn Electrical Industries, Ltd.

Irish Control Gear Agreement

An agreement has been signed between Lee Guinness, Ltd., of Newtownards, Northern Ireland, and A.S.E.A., of Sweden, for the manufacture under licence of A.S.E.A. designed contactors which will be incorporated in automatic control gear. The agreement includes arrangements for full technical liaison between the British and Swedish companies. Recently, the Northern Ireland Government announced that a new factory was to be erected for Lee Guinness at Newtownards. Production of automatic control gear at this factory will commence in 1958.

Electrical Commercial Travellers

The North Western branch of the Electrical Trades Commercial Travellers' Association recently held its general meeting at the Waggon and Horses Hotel, Manchester. After the business, an interesting talk was given on Russia by Mr. A. Haworth, who has spent many years there. Members are reminded of the annual luncheon on 17th October and the hot pot supper on 1st November.

Merseyside Heating Exhibition

A "Comfort Heating" Exhibition is being held by the Merseyside and North Wales Electricity Board at its Industrial Development Centre, 83, Paradise Street, Liverpool, 1, for two weeks commencing on 30th September. The exhibits will include an electrically heated carpet underfelt which will be presented as a commercial product for the first time.

The design of an experimental carpet underfelt which is heated electrically and which can be used, simply and economically, for domestic space-heating, has had the attention of the Board's engineers for nearly eighteen months. The Board has carried out the final development work in conjunction with E. Illingworth & Co., Ltd., of Bradford, Yorks, an associate company of John Crossley & Sons, Ltd., who have formed a new company, named Thermalay, Ltd., to market the "Thermalay" heated carpet underlay. It consists of two layers of underfelt between which the plastic-covered electric cable is fixed. The element is manufactured by Calidec, Ltd., from p.v.c. insulated cable. The heaters are designed to operate at 230/250 V a.c. or d.c. and have a standard twin flexible connection for plugging into ordinary sockets. The carpet heaters produce a temperature—at floor level—of 70 deg F to 75 deg F which will maintain a room temperature of 57 deg F to 63 deg F. These underfelts will be on sale during the autumn in all the Board's service centres and by a selected number of carpet retailers.

Part of the showrooms of the new branch of H. F. Scriven, Ltd., electrical engineers and contractors, which has recently been opened at 93, High Street, Stevenage

Radio Hobbies Exhibition

At the Radio Hobbies Exhibition which will be held from 23rd to 26th October at the Royal Horticultural Old Hall, Westminster, exhibitors will be able to demonstrate their products from the amateur television stand where six cameras and full studio facilities will be available to them. Home construction and chassis soldering will be demonstrated with close-ups. On show will be television telephone links and the Royal Air Force will be demonstrating radio controlled models.

Instrument Company's New Headquarters

At a recent ceremony in Greenford, Middx., Mr. E. C. Vorlander, managing director of Honeywell-Brown, Ltd., laid the foundation stone for the new head offices of the company, which it is hoped will be opened in June next year. The new premises will have a floor space of 483,000 sq ft and will accommodate the administration of all divisions—industrial instrumentation, thermostatic controls, and micro switches. The building will also include a training school.

Clean Air Conference at Hastings

Among the speakers at the annual conference of the National Smoke Abatement Society at Hastings, from 2nd to 4th October, will be the Minister of Power, Lord Mills, and the Director-General of the Meteorological Office, Sir Graham Sutton, F.R.S. The Minister will address the conference at its opening session and Sir Graham is to give the Des Voeux Memorial Lecture on "Meteorology and Air Pollution." The conference, which will be attended by 700 members and delegates, will include a presidential address by Dr. R. Lessing, on "The Primary Sources of Air Pollution," and three sessions will be given to papers and discussions on "Air Pollution from Road Vehicles," "Administration of the Clean Air Act" and "Industry and the Clean Air Act." The programme and registration details can be obtained from the Society at Palace Chambers, Bridge Street, London, S.W.1.

E.A.W. Conference

Some 150 members from many of the various branches of the Electrical Association for Women are to attend a three-day conference from 1st to 3rd October at Clacton, when the main object is to give the officers and potential officers guidance in carrying out their duties and in conducting their branch affairs on constitutional lines. For the first time a public speaking competition is to be held on the subject of the Association's current campaign, "Electricity for Everywoman."

Electric Vehicle Driving Licences

The Electric Vehicle Association of Great Britain, Ltd., has been in negotiation since 1956 with the Ministry of Transport and Civil Aviation on the subject of driving licences. One of the matters taken up has been the need to absolve a holder of a provisional licence ("L" driver) from the necessity to be accompanied by a qualified driver when driving a single-seater electric vehicle. The Minister of Transport and Civil Aviation has now informed the Association of the reimposition of the regulation on 1st October (relaxed

on 17th December last) requiring the holder of a provisional licence to be accompanied by a qualified driver when driving a motor vehicle. The regulation, however, requiring "L" drivers to be accompanied by an experienced driver is not to be reimposed in respect of single-seater electric vehicles of not more than 16 cwt unladen weight.

Materials Handling Convention

The Materials Handling Group of the Institution of Production Engineers has arranged a three-day convention, to be held at Leamington Spa from 28th to 30th October. The programme includes visits to factories in the Leamington and Coventry areas. A paper on "The Mathematics of Handling" will be given by Dr. K. D. Tocher (United Steel Companies, Ltd.). Further particulars may be obtained from the secretary, Institution of Production Engineers, 10, Chesterfield Street, London, W.1.

Aluminium Agreement

An agreement, subject to Treasury approval and to completion of formalities, has been concluded between Tube Investments, Ltd., and the Reynolds Metals Group of the United States, to combine the interests and activities of both groups in the aluminium industry in the United Kingdom. The agreement provides for the formation of a new company to be called Reynolds Metals & T.I. Aluminium, Ltd., which will take over the existing aluminium undertakings of T.I. Aluminium, Ltd. The company will be owned equally by T.I. and Reynolds. The chairmanship of the company will alternate between Sir Ivan A. R. Stedeford, chairman of Tube Investments, Ltd., and Mr. R. S. Reynolds, Jnr., president of the Reynolds Metals Company. Sir Ivan will be the first chairman.

George Johnstone Lecture

The George Johnstone lecture given annually at the Seale Hayne Agricultural College, Newton Abbot, Devon, will this year be given by Sir Harold Hartley on 25th October. His subject will be "Food and Energy."

Transatlantic Telephone Cable

The Telegraph Construction & Maintenance Co., Ltd., has issued an illustrated brochure describing the manufacture and laying of the first transatlantic telephone cable, for which Submarine Cables, Ltd., jointly owned by the Telegraph Construction & Maintenance Co. and Siemens Edison Swan, Ltd., manufactured over 92 per cent of the submarine cable required. The brochure describes many of the manufacturing and shipping problems encountered, and how they were overcome.

Aircraft Electrical Equipment

In our review of the electrical equipment shown at the S.B.A.C. Exhibition at Farnborough (6th September issue) we regret that the captions of two illustrations were inadvertently transposed. The photograph on page 418 described as the Denis Ferranti Dekatron power unit was in fact the Plessey 3 kVA invertor and that on page 419 given as the invertor was the Dekatron.

Marine, Welding and Nuclear Energy Exhibition

The organisers of the Engineering, Marine, Welding and Nuclear Energy Exhibition announce that the next exhibition in this series will be held from 16th to 30th April, 1959.

American Contractors' Visit

Last week we reported that a small party of members of the National Electrical Contractors' Association, of America, were on a visit to this country and had been to the works of the Benjamin Electric, Ltd. James Burness (Travel), Ltd., who arranged the visit through the (English) Electrical Contractors' Association, tells us that the party were also shown round two of the works of M.K. Electric, Ltd., Edmonton. They were escorted by Mr. R. W. Dowsett, general works manager and executive director, and Mr. H. P. Sale, sales manager. Before their works visits the party inspected the Battersea power station by arrangement with Mr. Griffin, the station superintendent.

Change of Address

As from 1st October the address of the Lead Development Association and that of its affiliated section, formed to promote the activities of the now dissolved Lead Sheet and Pipe Council, will be 18, Adam Street, London, W.C.2 (telephone: Whitehall 4175).

Trade Announcements

With effect from 1st October the major part of the sales area of **Laurence, Scott & Electromotors, Ltd.,** in the counties of Bedfordshire and Hertfordshire will be transferred from its East Anglia sales area to its London area, and Mr. C. A. Bendall, who has been in charge of industrial sales in East Anglia for some years, will operate from the London office (Manfield House, Southampton Street, Strand, London, W.C.2.). Mr. P. Groom, who has been assistant to Mr. Bendall, will now represent the company for industrial equipment in the remaining East Anglia area and will continue to operate from the Norwich Works.

Castell Locks, Ltd., has moved to Kingsbury Works, Kingsbury Road, London, N.W.9 (telephone: Colindale 5588).

Renold Chains, Ltd., has opened a new sales branch office and stock depot at 50, Scotswood Road, Newcastle-on-Tyne (telephone: Newcastle 24185), under the control of Mr. T. N. Johnston.

E. K. Cole, Ltd., announce the appointment of Mr. J. C. Wilcox as "Thermovent" technical sales representative for the Birmingham area, replacing Mr. R. E. Durham who recently resigned to take up a post in Canada. Mr. Wilcox will operate from the company's Birmingham depot at 11, Brook Street (Central 2505).

Studio Irwin Technical, Ltd., 8, Breams Buildings, London, E.C.4, informs us that it has recently taken over larger premises. The company undertakes the preparation of instructional material, with particular reference to handbooks, and sectioned and "exploded" perspective illustrations. It has an electronic section which deals with text, illustrations or circuit diagrams for technical publications in this field.

Rhoden Partners, Ltd., have removed to larger premises at 29, Park Crescent, London, W.1 (telephone: Langham 7488).

Materials Handling Equipment (Great Britain), Ltd., sole concessionnaires for the "Irion" side operating fork-lift carriers, has removed to 40a, Dover Street, Piccadilly, London, W.1 (telephone: Grosvenor 2934).

Polypenco, Ltd., makers of engineering industrial plastics, have opened an office and factory in Tewin Road, Welwyn Garden City.

Keith Blackman, Ltd., has opened a new acoustic laboratory at its head office and works at Tottenham, London, N.17.

The telephone number of **Denis Ferranti Meters, Ltd.,** Bangor, North Wales, is now Bangor 3232.

Electrical Exports in August

The total value of British exports of electrical machinery, apparatus and appliances in August was £18·3 million. It was not to be expected that the high figure of £21·7 million for July would be repeated, as the figure for that month included exceptionally large shipments of submarine cable. August is the "holiday" month of the year, but although the value of exports was less than for some of the earlier months of this year, the total was nevertheless some £300,000 higher than for the corresponding month of 1956.

Heavy electrical plant (generators, convertors, rectifiers, switchgear, etc.) advanced by nearly £400,000 as compared with a year ago, and telegraph and telephone apparatus by over £350,000. Exports of cables and wires fell in August to £2·6 million, as compared with £4·6 million in July this year and £3 million in August, 1956, and there were some fluctuations in exports of the smaller appliances. Details of the month's exports will appear in our next issue.

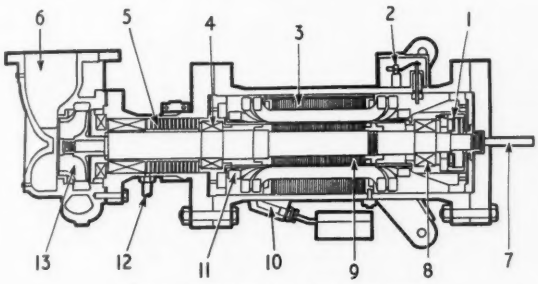
NEW ELECTRICAL EQUIPMENT

Glandless Circulating Pumps

Glandless pumps which have been designed primarily for circulating hot water in the heat exchange systems of steam generators are now available from HAYWARD TYLER & CO., LTD., P.O. Box 2, Luton. The heart of the pump is a squirrel cage induction motor with water lubricated bearings, the machine normally running full of water.

Two types of machine are available. In one the windings are covered with Class H insulation and protected against the ingress of water by a thin metal sleeve or "can" slipped into the rotor gap. The larger sizes have an external pressure shell and the electrical connections are brought out through hermetic seals. The second type of motor uses plastic-insulated windings and relies on water for cooling.

1. Thrust bearing. 2. Cable entry. 3. Stator. 4. Journal bearing. 5. Thermal baffle. 6. Pump suction. 7. Cooling water inlet. 8. Journal bearing. 9. Rotor. 10. Thermometer. 11. Motor windings. 12. Cooling water outlet. 13. Pump impeller



Hayward Tyler glandless circulating pump

The efficiency of such a motor is usually not much inferior to that of an ordinary electric motor of comparable horse-power.

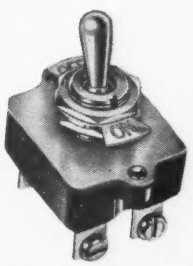
In the design the heat flow from the pump to the motor is greatly diminished by the provision of a separating neck of reduced diameter, fitted with a series of stationary baffles designed to minimise thermal convection.

In order to keep the bearings in cool liquid they are housed in the motor enclosure, and the pump impeller is mounted on an extension of the motor shaft. It is usual for such pumps to work at suction pressures not much above the vapour pressure of the liquid, so that special impeller designs are needed. The impeller generally provides a measure of axial balance, the remainder of the axial thrust being carried by the thrust bearing inside the motor shell.

Glandless circulating pumps have the advantage of not requiring bedplates, and can, therefore, more easily cope with movements of suction and delivery piping caused by temperature changes. Experience has proved that they are capable of working for more than a year without stripping for inspection.

Miniature Switch

A miniature double pole 10 A toggle switch has recently been introduced by ARCOLECTRIC (SWITCHES), LTD., Central Avenue, West Molesey, Surrey. It is a double pole on/off positive snap action switch rated at 10 A 250 V a.c. and is designed on the micro gap principle with fine silver contacts. Other features of the design are long life—it has been type tested on its full rated load to a quarter of a million operations—and compactness. The list price is 5s.



Arcolectric miniature 10 A double pole switch

Valve Protecting Timer

A delayed reset timer, type TDR/S/P635, designed for the protection of thermionic valves in transmitting, receiving and control equipment, has recently been introduced by VENNER, LTD., Kingston By-Pass, New Malden, Surrey. A typical application is valve protection on radar equipment. After the initial switch-on, the timer operates as a standard delay relay. This ensures that the h.t. voltage is not connected until the filaments have warmed up. Upon switching off, the timer resets to zero at a delayed rate controlled by an escapement. This delayed reset feature prevents the full initial delay period having to be completed after a supply interruption of a shorter duration than the normal warm-up time.

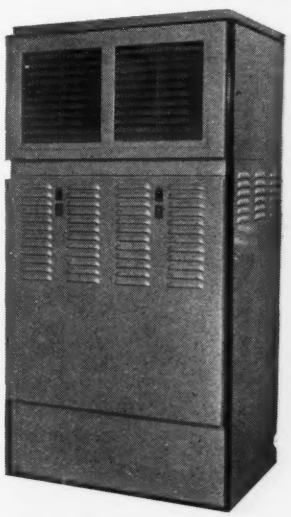
The reset time can be either the same as the initial delay period or some proportion of this period, e.g. 5 min delay time, 2½ min reset time. The unit can therefore be calibrated for the cooling characteristic of the equipment under control. A further feature is that the time contacts can be arranged to stay closed during very brief supply interruptions of less than say 10 sec duration, opening only when the relay is de-energised for longer than this period. The timer is fitted in a steel container measuring 8in by 4¾in by 3¼in with connections brought out to sealed terminals. Its operating temperature range is −40 to +70 deg C.

Venner delayed reset timer with cover removed

Air Conditioning Heat Pumps

Equipment designed on the heat pump principle has recently been introduced by HEAT PUMP & REFRIGERATION, LTD., 34, Napier Road, Bromley, Kent, to provide uniform temperature conditions throughout the year in such situations as beer cellars, offices, hospitals, theatres and dance halls. Basically the system is so arranged as to furnish heating or cooling as required and to allow the admission of fresh air. Air can be heated in the winter, cooled in the summer, dehumidified and recirculated. In every case a filter can be incorporated and admission of fresh air can be varied to the desired degree.

The change-over from heating to



H.P.R. air conditioning heat pump

cooling can be accomplished within minutes, which is important in places where wide temperature fluctuations are common.

Heat pumps up to 2 h.p. can be in the form of window-type or through-wall type. Above 2 h.p. and up to 10 h.p. the units are of the free-standing type occupying minimum floor space. Above 10 h.p. the units must be centralised and cold or hot air distributed by means of ducting. The coefficient of performance of most of the units is three, which means that for each kW of power consumed by the unit the equivalent of 3 kW of heating is obtained.

Fluoroscopic and Radiographic Unit

An apparatus for the non-destructive examination of large quantities of components, which promises to be of the utmost value to manufacturers, has recently been designed by MARCONI INSTRUMENTS, LTD., St. Albans, Herts. The equipment, a 250 kV constant-potential fluoroscopic and radiographic unit, has been supplied to the Nobel Division of Imperial Chemical Industries, Ltd., where it is being used in the checking of fuses, fuse wire, detonators, and components of various kinds.

Apart from the facility of fluoroscopy (direct visual inspection) the equipment can be used for radiography of both small and large components. Manipulation of a foot pedal opens a shutter in the front of the case, permitting the insertion of detonators and other small components on a tray. For radiographic inspection, the operator inserts a cassette above the tray. Radiography of larger objects, up to 6in in diameter and 24in long, can also be carried out, the items being inserted through a door in the back.

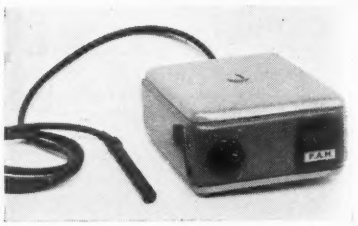
The seated operator, looking through a viewing hood conveniently placed above the shutter, observes the fluoroscopic image reflected on a first-surface mirror; this method, combined with layers of lead glass, shields the operator from direct radiation. Further protection is provided by means of the $\frac{1}{4}$in thick lead-lined case, combined with a safety interlock system which prevents the generation of X-rays with either the shutter or back door open.

Marconi Instruments 250 kV constant-potential fluoroscopic and radiographic unit

Substantial savings are made in time and expenditure of film, for large quantities of components can be quickly checked by fluoroscopy, and only those which do not pass this test need to be subjected to radiographic inspection.

Transistorised Counter

A new battery portable transistorised counter designed for counting small production quantities at a maximum rate of four per second is now available from P.A.M., LTD. (Electronics Department), at Merrow, nr. Guildford. It has a built-in photo-electric cell, or alternative remote photo-electric cell probe. The battery life gives 250,000 continuous counting operations. The casing is strongly



P.A.M. counter with remote photo-electric cell probe

constructed of hammered finished steel and measures $4\frac{3}{4}$in by $3\frac{3}{4}$in by $1\frac{7}{8}$in.

The price is £12 10s for the model with the built-in photo-electric cell; or £13 for the model with the alternative remote photo-electric cell probe.

Generating Sets

In describing the new range of diesel-engine generating equipment introduced by Henry Meadows, Ltd., in our 13th September issue, the set illustrated was incorrectly given as 63 h.p.; this should have read 63 kW.

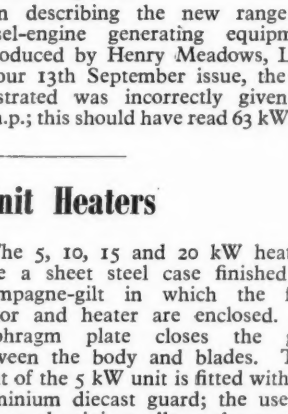
New Range of Unit Heaters

The introduction of a range of electric unit heaters of improved appearance, and designed to appeal both to home and overseas markets, has recently been announced by the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2. They cover a range from 3 kW to 20 kW and comply with the special requirements of American, Swedish, Norwegian and Swiss standards, as well as those of the projected European Common Market and of the United Kingdom.

Improvements in design are: a more uniform air temperature; compliance with the test specification required overseas; all live and moving parts are screened; and safety switches are installed as a guard against overheating. There are two specific designs—one for the 3 kW unit heater and the other for the 5, 10, 15 and 20 kW models.

The 3 kW unit is manufactured from diecast aluminium finished in champagne-gilt heat-resisting lacquer and has an open-coil heating element. The unit's fan has a phenolic moulded impeller driven at 1,150 r.p.m. by a totally enclosed fan motor with self-oiling, self-aligning, noiseless bearings. The motor is suitable for running in normal ambient temperatures not exceeding 105 deg F. The flow of air can be directed where required by inclining the heater forward and turning it to either side. The unit, which has a wall fixing bracket, tilts to a maximum of 45 deg to the vertical. A hand reset thermal cut-out is fitted. The fan can be operated with the heater switched off if desired. The price of the unit is £14 10s.

The 5, 10, 15 and 20 kW heaters have a sheet steel case finished in champagne-gilt in which the fan, motor and heater are enclosed. A diaphragm plate closes the gap between the body and blades. The front of the 5 kW unit is fitted with an aluminium diecast guard; the use of diecast aluminium allows the casting



G.E.C. 3 kW unit heater

of thin vanes, providing lower resistance to the air flow, and keeps the sound level at a minimum. The units have open-coil heating elements which can be switched off for operation of the fan only. When mounted on a girder or wall, the heaters can be tilted to adjust the direction of air flow downwards to a maximum of 40 deg to the vertical and they can be turned to any desired position in the horizontal plane. They can be supplied for single-phase three- or four-wire, three-phase and for d.c. Prices range from £18 15s for the 5 kW heater to £38 for the 20 kW heater.

ELECTRICAL RESEARCH

Recent Publications of the E.R.A.

AMONG the recent publications to be issued by the British Electrical and Allied Industries Research Association is Ref. W/T32, " The Influence of Ultrasonic Waves on Biological Materials," by Dr. Margaret J. Thornley (price 21s). Investigations in this particular field date from the classic paper of Wood and Loomis (1927), describing the effects of intense ultrasonic fields on a variety of organisms ranging from bacteria to small fish and frogs. Early investigations, mainly concerned with unicellular animals, red blood corpuscles, and plant cells were reviewed by Harvey (1930). More recent surveys are those of Bergmann (1949) and Gregg (1950), and a comprehensive bibliography of biological, biochemical and biophysical applications was published by Naimark, Klair and Mosher (1951).

The present report contains a brief outline of the properties of ultrasonics which are likely to affect biological materials and the types of apparatus employed. The effects of viruses, bacteria, animals and plants are grouped according to the type of organism concerned, and medical research is not included.

The term " ultrasonic " should, strictly speaking, be confined to frequencies above about 20 kc/s, the upper limit of the audible range, but for convenience it has been used here to include frequencies down to 8 kc/s. The work was carried out at the University of London.

Electrical Breakdown of Solids

In Ref. L/T352, " Short-Time Electrical Breakdown of Solids by External Discharges," by K. W. Ogilvie, Ph.D. (price 12s 6d), experiments are described showing that when " Perspex " is subject to discharge in a liquid at a voltage sufficient to cause breakdown in about 1 min, failure is preceded by the formation of microscopic channels passing into the material. Evidence is given that these are caused by the emission of electrons from the material at the surface adjacent to the positive electrode. Photomicrographs of breakdowns interrupted within 10 μsec are shown.

It should be noted that issue of this report has been delayed by absence of the author abroad, and the results here reported are preliminary to those already published in report Ref. L/T310, and in I.E.E. Monograph No. 128, 1955.

Surges in Transformers

The distribution of surge voltages in transformer windings has been treated in a number of earlier reports, viz. Refs. S/T2, S/T4, S/T19 and S/T34, all of which are incorporated in " Surge Phenomena," Ref. S/T35. Later reports on the same general subject are Refs. S/T48 and S/T55. Ref. S/T69, " The Effects of Cylindrical End Rings on the Distribution of Surge Voltages in Transformer Windings," by E. L. White, B.Sc.(Eng.), A.M.I.E.E. (price 12s), describes an experimental investigation of the modification in surge voltage distribution which is produced by conducting cylinders connected to the end terminal and arranged to shield a portion of the winding at the line end.

This report gives an account of an experimental investigation of the effects of cylindrical end rings on the distribution of surge voltages in a transformer winding. The investigation was made in order to supplement the data already obtained on the effects of reinforced end turn insulation, which is given in Ref. S/T34. Measurements were made on an experimental transformer fitted with coils of the cross-over type, and the effects of three simple arrangements of cylindrical end rings mounted coaxially with the windings were examined in some detail.

Lightning and Buried Cables

In a series of papers E. D. Sunde of the Bell Telephone Laboratories has built up a theory of the lightning stroke to a buried wire (counterpoise) or a buried cable. His work deals with direct strokes, including those which channel through the earth or are deliberately guided to the installation, as well as those which do not enter the wire or cable, such as cloud-to-cloud flashes and strokes, and strokes to nearby points of the earth.

Report Ref. S/T71, " The Direct Lightning Stroke to a Buried Cable " by B. L. Coleman, B.Sc. (price 9s), comprises a critical review of the foundations and development of the sections dealing with direct strokes to buried cables, together with an analysis of the effect of a leader stroke on earth breakdown in the vicinity of the point struck.

Moisture in Paper Insulation

One factor causing degradation of electrical equipment is the presence of moisture in the dielectric. Work at the E.R.A. has led to the development of an instrument which responds to moisture in insulation, and this is described in Ref. V/T128, " The Relation Between Dispersion and Moisture Content in Paper Insulation," by D. C. G. Smith, B.Sc., A.Inst.P. (price 10s 6d). The apparatus measures the dielectric dispersion (i.e. the relative increase in instantaneous capacitance) over the time range of 3-300 millisec. Early work had shown that dispersion increases as the moisture concentration increases and the present work was undertaken to examine the correlation more closely. Since 50 c/s loss angle is well established as an index of quality, its correlation with dispersion has also been examined.

One application of the dispersion meter appears to be in the control of the pre-impregnation drying process for equipment using paper insulation (e.g. high-voltage transformers). In the course of the present investigation data have also become available enabling a correlation to be established between the equilibrium moisture content of paper and the water vapour pressure of the ambient medium. Although this was not a primary objective of the investigation, it is included here since it is of interest in connection with the drying of unimpregnated paper insulation.

Testing H.T. Stabilisers

The existing literature on stabilised power supplies contains very little on the methods of testing such supplies. The main difficulties of accurate measurement of stabilisation ratio or output impedance are listed in Ref. V/T129, " Testing of H.T. Stabilisers," by S. J. Zgorski (price 15s).

The report describes a test unit which largely overcomes the difficulties and facilitates quick measurements of the output impedance and stabilisation ratio at direct current and over a frequency range. The unit utilises

normal laboratory auxiliary equipment such as oscillator, valve voltmeter and micro-ammeter.

The unit was designed to provide an easy means for the initial testing and subsequent routine checks of a large number of stabilisers used in the E.R.A. network analyser. The stabilisers are supplied from a central d.c. plant. The unit, therefore, was designed for stabilisers which do not have their own rectifying circuits, but can easily be adapted for testing self-contained stabilised power supplies.

Copies of the above reports are available at the prices indicated in parenthesis from the British Electrical and Allied Industries Research Association, Thorncroft Manor, Dorking Road, Leatherhead, Surrey.

Electrical Trade of Austria

INCREASED IMPORTS AND EXPORTS IN 1956

By R. E. KAAN, DIPL.ING.

AUSTRIA'S electrical exports last year were valued at £9·3 million, an increase of 25 per cent against 1955; her imports rose by 29 per cent to £13 million during the same period. The country's four manufacturers of heavy generating plant and ancillary equipment—Siemens, A.E.G., Brown Boveri and Elin—are under strong pressure to meet home and export orders. During the next five years or so conventional power stations, railway electrification and industrial mechanisation will assure the industry of a base load.

Two recent major loans by the World Bank in connection with power projects total $31 million, of which $21 million is required for the large Danube power station at Ybbs-Persenbeug, and the rest for two thermal plants in the south-west of the country. These loans represent about 24 per cent of the total costs. Both projects are part of a plan to meet the increasing home demand and supply additional power for export to neighbouring countries.

Existing manufacturing capacity is hardly sufficient to meet all likely requirements; more business could be accepted if there was a certainty of being able to meet delivery dates and this situation seems likely to continue in the foreseeable future. Recent additions to manufacturing capacity and modernisation of the former Russian-occupied plants are in progress and the industry is making the fullest use of available floor space.

Austria's foreign trade figures, shown in Table 1, reveal that she not only is an exporter of electrical plant and equipment but also a desirable, but highly competitive, market. (£1=schilling 72·8.) Last year's imports were mainly domestic appliances, electronic equipment and water turbines. Common frontiers and language made West Germany and Switzerland the main suppliers of electrical goods and apparatus. Austria's imports from the United Kingdom, valued at about £500,000, decreased slightly during the past year in spite of progressing liberalisation of imports. Domestic appliances and to some extent electronic equipment represent the bulk of the United Kingdom exports to Austria. (Table 2.)

Austria's electronic industry has rapidly developed and last year Holland took the lead from West Germany as her main market. The country's electrical industry exported a considerable amount of rotating machinery to the "Iron Curtain" countries, including Russia. (Table 3.) Export of power station equipment plays an important part in her foreign trade. (Table 4.) Australia was Austria's best customer for transformers.

Austria has enjoyed an extensive boom in trade and industry for a considerable time, and the increased purchasing power of the population has given rise to conditions favourable for United Kingdom exports. The extensive building programme gives good scope for the supply of domestic equipment. It is possible to import without quantitative restrictions the bulk of the United Kingdom's electrical goods. If full advantage is to be taken of this position, British products must be presented in a manner to which Austrians are accustomed and, secondly, in such a way as to put the advantages of buying from the United Kingdom clearly before the public, who have a very varied choice of goods from neighbouring countries.

Table 1.—Austria's Principal Electrical Suppliers, 1956
(Thousand schillings)

Country	Value
United Kingdom	35,132
West Germany	580,925
Switzerland	102,465
Holland	82,367
Sweden	21,948
United States	37,595
Total (all countries)... ...	939,027

Table 2.—Leading Electrical Imports, 1956
(Thousand schillings)

Class	Value
Motors, generators and parts...	82,816
From United Kingdom ...	1,680
,, West Germany ...	62,476
Portable tools and domestic appliances	232,148
From United Kingdom ...	11,770
,, West Germany ...	160,116
Transformers and parts ...	26,019
From United Kingdom ...	72
,, West Germany ...	13,689
Telegraph equipment ...	17,788
From West Germany ...	10,291
Telephone equipment ...	14,775
From United Kingdom ...	8,882
Radio receivers, chassis and parts	30,508
From United Kingdom ...	849
Radio transmitting equipment	24,085
From West Germany ...	21,485
Electro-acoustical appliances	59,308
From United Kingdom ...	1,482
,, West Germany ...	16,407
,, United States ...	25,233
TV equipment	13,363
From West Germany ...	13,016
Other electronic apparatus ...	27,389
From United Kingdom ...	650
,, West Germany ...	18,461
X-ray and electro-medical apparatus	17,667
From West Germany ...	13,708
Measuring and indicating appliances	21,781
From West Germany ...	17,112
Filament lamps	14,778
From Holland	9,549
Electronic tubes	17,034
From Holland	12,692
Heating appliances	57,799
From United Kingdom ...	1,087
,, West Germany ...	37,127
Electrical apparatus and appliances, n.e.s.	213,036
From United Kingdom ...	5,728
,, West Germany ...	132,700
,, Switzerland	37,114

Table 2.—(*continued*)

Class	Value
Porcelain insulators and bushings	13,200
From West Germany ...	8,707
Steam turbines and parts ...	22,065
From West Germany ...	21,674
Water turbines and parts ...	34,973
From Switzerland	22,496

Table 3.—Principal Markets for Electrical Exports, 1956
(Thousand schillings)

Country	Value
United Kingdom	5,182
West Germany	62,080
Yugoslavia	66,106
Poland	55,223
Switzerland	26,739
Holland	98,482
Sweden	23,993
Russia	60,944
Australia	21,913
India	14,742
United States	13,360
Total (all countries)... ...	670,868

Table 4.—Exports of Principal Electrical Products
(Thousand schillings)

Class	Value
Motors, generators and parts	131,690
Generating sets, complete ...	3,561
Portable tools and domestic appliances	17,254
Convertors, rotating ...	19,643
Transformers and parts ...	93,603
Telegraph apparatus ...	2,382
Telephone apparatus ...	41,169
Radio apparatus and parts ...	24,771
Electro-acoustical apparatus	62,157
TV receivers	4,358
X-ray and electro-medical apparatus	35,345
Measuring and indicating instruments	29,247
Filament lamps	13,242
Electronic tubes	13,373
Heating appliances	23,697
Electrical appliances and apparatus, n.e.s.	87,208
Cables, lead covered ...	22,168
Ditto, others and wires ...	19,276
Steam turbines and parts ...	4,356
Water turbines and parts ...	116,691

SOUTHEND-ON-SEA STATION MODERNISATION

The new ticket office of Southend-on-Sea (Central) Station

The Eastern Region's £24,000 modernisation scheme for Southend-on-Sea (Central) Station has now been completed. It is the largest of nine stations serving Southend and in addition to dealing with several million business travellers and holiday visitors a year a considerable parcels traffic is handled. The modernisation scheme has included the provision of a new glass-fronted ticket office, rearrangement and modernisation of the up parcels and left luggage office, extension and re-designing of refreshment-cum-waiting room, erection of a new office for the police and staff rooms, and the substitution of electric lighting for gas throughout the station premises.

Illumination of the booking office, platforms and subway is by means of specially designed lanterns utilising cold cathode tubing. Four types are in use. The "Double Overlite" lantern is mounted on a slim pre-stressed concrete column specially designed by the Eastern Region architect for use in connection with platform lighting. Manufactured by Ionlite, Ltd., they incorporate a number of novel features. Safety devices are incorporated so that the removal of any portion of the lantern interrupts the medium voltage supply to the fitting. A Mark IX fitting is used in the subway where its shallow depth is made use of in the limited headroom. The refreshment-cum-waiting room is illuminated by Falks "Perseus" fittings and the other waiting rooms by Forest modern D5X and D3X fittings. Totally recessed hot cathode fluorescent fittings are utilised in the new booking office and in the refreshment room bar "de-luxe warm white" tubes have been used to avoid colour distortion. Total loading of the station is approximately 40 kW, of which the platform lighting installations amount to 22 kW. The lighting installations were designed by Mr. K. J. Cook, chief mechanical and electrical engineer, Eastern Region, and the installation work has been carried out by George E. Taylor & Co.

IN THE COURTS

False Trade Description Alleged

At the Old Bailey last week E.M.P. Electric, Ltd., of Tottenham, were charged in four counts with applying false trade descriptions to 600, 400, 250 and 200 A fuse links between 31st December, 1955, and 1st May, 1956. They pleaded not guilty. Kurt Dannenberg (48), chartered electrical engineer, a director of E.M.P. Electric, Ltd., faced four charges of causing the company to apply the false trade descriptions. He also pleaded not guilty.

Mr. Neville Faulks, who prosecuted for the Board of Trade, said that the fuses concerned were all said by E.M.P. Electric to have been certified by the Association of Short-Circuit Testing Authorities as conforming to British Standards Institution specification, when in fact they had not been tested by this body. In May, 1956, as a result of information which they had received, a Board of Trade inspector went to the offices of G. P. Dennis, Ltd., at Speke, to collect some samples of the fuse links supplied by E.M.P. Electric. These were later tested and three (600, 400 and 250 A) failed to conform to the test, and in fact when the 600 A fuse link was put to the test it was destroyed and the fuse barrel shattered, indicating the possibility of injury to operatives.

Although the 200 A fuse links did not positively fail, the prosecution submitted that it was wrong to say it was A.S.T.A. certified.

Mr. Dennis had said that he thought the fuses complied with the British Standards Specification, otherwise he would not have purchased them.

At the time of the alleged offences, said counsel, E.M.P. Electric held certificates only in relation to 500 and 300 A fuse links.

The case was still proceeding at the time of going to press.

Access to Cables

At Sunderland Quarter Sessions an appeal by the North Eastern Electricity Board against the decision of Sunderland magistrates approving the stopping up of certain streets was rejected. Sunderland Corporation intends to build a £200,000 block of flats in the area, and it was proposed to stop up several streets. The Electricity Board objected on the grounds that there were cables in the streets and the Board would not have proper access to them. The Corporation stated that ducts would be provided under the buildings to carry the cables.

Mr. J. T. Clewly (sub-area engineer) said that he would not recommend putting cable ducts under houses, as gaining access to them would be a costly business. Cables under gardens would also be unsatisfactory as there was a risk that a garden fork would pierce them.

The Recorder rejected the Board's appeal which he said was not relevant to the closing of the streets because inspection of the cables would only be impeded when houses were built on them. He was only concerned with the closing of the highways, and he was not satisfied that the Electricity Board had a grievance in this matter.

PRICES OF MATERIALS

In the accompanying table we give the basis prices of the more important materials used in the electrical industry. The figures given are the selling prices and are those quoted on Tuesday last.

ALUMINIUM ingots	ton £197 0s 0d
COPPER, H.C. Electro	ton £190 10s 0d
Fire Refined 99·70%	ton £189 0s 0d
Fire Refined 99·50%	ton £188 0s 0d
COPPER Tubes ..	lb 1s 11½d
Sheet	ton £217 10s 0d
H.C. wire and strip ..	ton £246 5s 0d
LEAD, English ..	ton £88 10s 0d
Foreign	ton £87 0s 0d
MERCURY	flask £87 0s 0d
TIN, block (English) ..	ton £739 10s 0d
ZINC, G.O.B. Foreign	ton £71 15s 0d
Electrolytic	ton —
BRASS Tubes (solid drawn)	lb 1s 7½d
Sheet	ton —
Wire	lb 2s 4½d
PHOSPHOR BRONZE Wire	lb 3s 7½d
PLATINUM	oz £31 0s 0d
RUBBER, No. 1 R.S.S. spot	lb 24½d—24⅝d

DOMESTIC ELECTRICAL EQUIPMENT

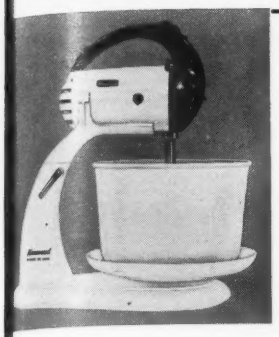
Food Mixers

WITH the use of an electrically operated food mixer much of the hard work entailed in the preparation of food in the kitchen is eliminated. In addition, such preparatory work can be carried out in a fraction of the time taken by hand, and what is perhaps more important in relation to hygiene, handling of food is reduced to the minimum.

Apart from the standard fittings supplied with most food mixers, there is a wide range of extra attachments which give the appliance a greater all-round usefulness. The Kenwood Manufacturing Co. has added to its range the A.310 mixer, a de-luxe version of the company's "Minor" model, while Sunbeam Electric has introduced the "Mixmaster Junior," a portable model which includes a three-speed switch in the handle.

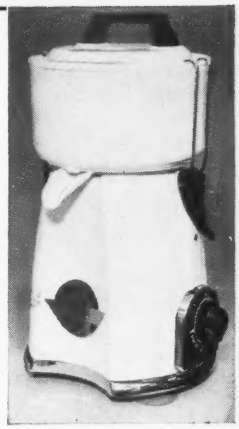
The prices of food mixers are much the same as those prevailing last year, apart from a slight reduction in the price of accessories as a result of a change in purchase tax from 30 to 15 per cent. The tax on the food mixer itself remains at 60 per cent.

Manufacturer	Name or Model	Capacity	Standard Equipment	Special Features	Finish
BROWN BROTHERS, LTD., Great Eastern Street, London, E.C.2.	"Duco"	Small bowl, 2 pint. Large bowl, 5 pint	Two glass mixing bowls	Beating speed variation, 250–750 r.p.m. T.V. interference suppressors	White enamel, black fittings and base
ENGLISH ELECTRIC CO., LTD., East Lancashire Road, Liverpool, 10.	"5500"	Small bowl, 2 pint. Large bowl, 5 pint	Two clip-in beaters, turntable and two ridged bowls	Portable mixer head, 20-speed control dial	Cream or white stoved enamel
FALK, STADELMANN & CO., LTD., 91, Farringdon Road, London, E.C.1.	"U.95643"	Small bowl, 2 pint. Large bowl, 4½ pint	Juice extractor, two beaters, turntable and two bowls	Variable speed control, anodised aluminium bowls	Cream enamelled body and turntable, black handle
FRAIKAD, LTD., 139-141, Farringdon Road, London, E.C.1.	"Romix Super"	4 pint	Juice extractor. Blender, shredder and dough mixer optional	Swiss manufacture	"Melamin"
	"Romix Combi" Mk. II	4 pint	Juice extractor, blender and shredder	Swiss manufacture	"Melamin"
	"Rotary Combinette"	—	Mixer with coffee grinder attachment	French manufacture	Plastic
HILLMAN ELECTRIC MOTORS, LTD., Crane Grove, London, N.7.	"Hillma-mix"	1 pint	Liquidiser	Portability, two-speed control	Red, blue, green, primrose, white or cream
KENWOOD MANUFACTURING CO., LTD., Old Woking, Surrey.	A.700D "Chef"	6 pint	"K" beater, whisk, dough hook, glass bowl and plastic cover	Planetary mixing action, wide variety of attachments. Double insulated	Cream or white stoved enamel with choice of 5 coloured accessories
	A.300 "Minor"	—	Two beaters, wall bracket	Portability, hangs on wall when not in use	White with black relief
	A.310 "Minor De-Luxe"	3 pint	Stand, bowl and beaters	Can be used as portable mixer	White with black or chromium relief
	A.955 "Kenmix 55"	1 litre	Liquidiser and power unit	Can be taken apart for easy cleaning	White stoved enamel
MIDLAND REPETITION & AUTO MANUFACTURING CO., LTD., Bayton Road, Exhall, Coventry.	"Rapide Mixstir"	3 to 5 pints	Two bowls, two beaters and juice extractor	Governor controlled motor gives full power at any speed	White and black stoved enamel
SIROMA ENGINEERING CO., LTD., North Acton Road, Harlesden, N.W.10.	"FM4A"	Small bowl, 2 pint. Large bowl, 5 pint	Two bowls, two beaters and recipe book	Governor controlled motor gives speeds between 250 and 750 r.p.m.	White stoved enamel body, black base
SUNBEAM ELECTRIC, LTD., Nerston, East Kilbride, Glasgow.	"Mixmaster"	Small bowl, 2½ pint. Large bowl, 6 pint	Two bowl-fit beaters, two bowls	Mix-finder dial, automatic speed control, portable use	White, cream or green stoved enamel, black Bakelite mouldings
	"Mixmaster" Junior	—	Two beaters, wall bracket	3-speed switch in handle	White stoved enamel, black Bakelite handle
VALMADE, LTD. Browells Lane, Feltham, Middlesex.	"Valmix"	3 pint	Two beaters	Portability	Cream, green or red
A. E. WARNER (LONDON), LTD., 56, Brewer Street, London, W.1.	"Turmix 450"	1½ pint glass goblet 3½ pint metal goblets	Available as mixer, juice extractor, shredder or lemon squeezer	Automatic speed adjustment, 3,000, 8,000 or 12,000 r.p.m.	White

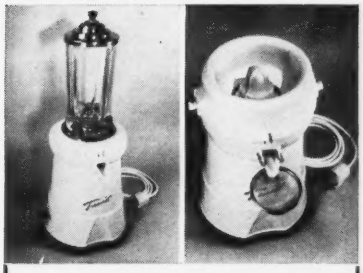


1

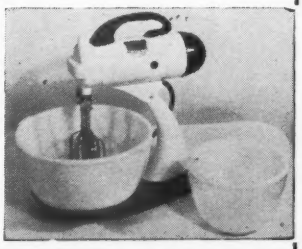
2



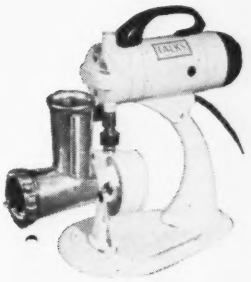
3



4



5



6

1. *Kenwood "Minor" de-luxe*
2. *Hillman "Hillma-mix"*
3. *Fraikad "Romix Super" juice extractor*
4. *A. E. Warner "Turmix 450"*
5. *Siroma "FM4A"*
6. *Falk, Stadelmann mixer fitted with power unit and mincer*
7. *Sunbeam "Mixmaster Junior"*
8. *Midland Repetition "Rapide Mixstir"*
9. *English Electric "5500"*

7

8

9

Price (excl. P.T.)	Purchase Tax	Price of Accessories (excl. P.T.)	Purchase Tax on Accessories
£14 10 0	£6 7 2	£1 10 0 juice extractor £4 0 0 power gear unit	£0 3 4 £0 8 9
£14 11 0	£6 7 8	£4 17 6 mincer £1 19 0 juice extractor	£1 1 5 £0 8 6
£16 15 0	£7 7 0	£4 4 10 power unit £2 8 0 mincer £2 8 0 grater	£0 9 4 £0 5 3 £0 5 3
£17 17 0	£7 16 8	£27 7 6	£3 4 2
£20 16 0	£9 2 6	—	—
£6 18 0	£3 0 11	—	—
£7 10 0	£3 6 0	£0 14 0 coffee mill	£0 6 0
£22 12 6	£9 18 6	* See below	* See below
£7 5 0	£3 3 8	—	—
£9 17 1	£5 15 3	—	—
£13 2 9	£5 15 3	—	—
£18 7 6	£8 1 3	—	—
£14 10 0	£6 7 3	£1 1 0 juice extractor £4 0 0 power gear unit	£0 2 4 £0 8 9
£16 15 8	£7 7 4	£5 3 4 blender £5 3 4 slicer and shredder £5 3 4 mincer £0 17 3 juice extractor	£0 11 4 £0 11 4 £0 11 4 £0 1 11
£9 2 6	£4 0 0	—	—
£5 12 0	£2 9 1	£0 12 6 mixer stand	£0 2 9
£32 10 0 (metal goblets £2 each extra)	£14 11 0	£3 10 0 lemon squeezer £5 10 0 juice extractor	£1 11 3 £2 8 0

* Kenwood A.700D "Chef" accessories:—Juice extractor, £1 9s 3d (plus 3s 3d purchase tax); oil dripper, 3s 7d (5d); meat mincer, £2 16s 4d (6s 2d); liquidiser, £4 7s 11d (9s 7d); colander, £2 3s 11d (1s 1d); coffee mill, £4 5s 7d (9s 5d); drive unit, £5 17s 2d (12s 10d); juice separator, £4 14s 8d (10s 4d); high-speed slicer and shredder, £6 17s 5d (15s 1d); potato peeler, £4 9s 8d (9s 10d); can opener, £1 17s 5d (4s 1d); glass bowl, £1 2s 6d (2s 6d); slicer and shredder, £4 1s 1d (8s 11d); stainless steel bowl £4 3s 4d (9s 2d)

Financial Section

STOCKS and SHARES

IT is evidently going to take some time for Stock Exchange markets to recover a firm footing after the upheaval caused by the Government's dramatic new financial measures. In the gilt-edged market the new Bank Rate required of course an immediate and drastic adjustment of prices, but the level appropriate to the changed conditions remains undecided until some evidence accumulates about the effectiveness of the measures, and consequently about the length of time that they are likely to remain in force. For industrials, problems arise also from the hardening of restrictions on the investment programmes of the nationalised industries and Government Departments, and on borrowing by private firms (the terms of the £10 million issue of Vickers 6 per cent loan stock at 96 were deprived of much of their initial attraction within a day or two of the offer being made). Such considerations were bound to make themselves felt upon shares connected with expanding industries such as electrical engineering. Financial advisers have been unanimous in counselling holders of fundamentally sound investments not to disturb them in conditions such as these.

Extent of the Damage

Market conditions were too unsettled, at the beginning of this week, for the changes in the accompanying shares lists to be taken as anything but a rough guide to the extent of the disturbance. In many cases prices became to some extent nominal, and in others the official quotations were not properly tested by actual transactions. They make it plain, however, that the recession affected with severity the ordinary shares of the leading electrical and atomic power groups. English Electric and A.E.I., for instance, suffered losses of six or seven shillings in the first few days after the Bank Rate decision, while Parsons and Reyrolle were also much lower. Among the heavy engineering shares, Babcock & Wilcox and Clarke Chapman were at one time showing losses of 10s or more, and declines of 5s upwards were fairly frequent, affecting among others B.I.C.C., British Aluminium, Ericsson, Plessey, Thorn, Westinghouse and Tube Investments. Signs appeared, however, of resistance to further recession.

British Electricity Stocks

Among Government stocks the extent of the fall in prices was heaviest among the "undated" issues such as 3½ per cent war loan, which was showing a loss of some 3½ points by the beginning of this week. Stocks with fixed repayment dates within a medium to long term of years had fallen by 2 to 3 points. In that category, the two 3 per cent British Electricity stocks, redeemable at 100 in one case between 1968–73 and in the other 1974–77, fell respectively to 70½ and 67. At this level they show current yields of between 4¼ and 4½ per cent, with the prospect of capital profits of about 30 points or more (representing over 40 per cent on the

Price Changes in

Company or Board	Nom. Value	Middle price 23rd Sept.	Week's Rise or Fall	Dividend Previous	Dividend Last	Yield %	1957 Highest	1957 Lowest
Gilt-edged Stocks						£ s d		
Brit. Elec. 1968/73	100	70⅛	−1⅛	3	3	4 5 0	80	70
Brit. Elec. 1974/77	100	67	−2	3	3	4 9 6	78½	66
Brit. Elec. 1976/79	100	71	−2	3½	3½	4 18 6	81½	70½
Brit. Elec. 1974/79	100	80	−2½	4¼	4¼	5 6 3	92½	79½
Overseas Electric Supply								
Calcutta Elec.	£1	17/6		6†	6·8†	7 15 6†	19/-	15/-
East African Power	£1	20/6	−6d	7	7⅛	7 6 3	21/-	19/-
Nigerian Elec.	£1	17/6		10	10	11 8 6	18/6	17/3
Perak Hydro-Elec.	£1	16/3	−1/3	10	10*	12 6 0	18/-	13/3
Electrical Shares								
Aberdare Cables	5/-	11/3x.d.	−1/-	17½	17½	7 15 6	12/6	9/9
Aerialite	1/-	5/9	−9d	45	48	8 7 6	6/9	4/9
Allen, W. H.	£1	45/6	−1/6	10	10	4 8 0	47/3	33/6
Anglo-Portuguese Tel.	£1	23/-	−1/3	8	8	6 19 3	27/6	20/6
Aron Elec. Ord.	£1	58/9		15	15	5 2 3	60/-	53/6
Assd. Automation	10/-	18/9	−3/3	5	7½	4 0 0	24/9	17/9
Assoc. Elec. Ord.	£1	55/-	−6/3	15	15	5 9 0	73/-	55/-
Automatic Tel. & El.	£1	68/9	−3/9	15	17	4 18 9	75/-	54/6
Babcock & Wilcox	£1	62/6	−10/-	15	15	4 16 0	82/6	60/-
Bakelite	10/-	22/9	−6d	16	15	6 11 9	24/6	20/9
Baldwin, H. J.	2/-	4/6		20	20	8 17 9	5/-	3/10½
Berry's Electric	5/-	6/-	−6d	—	10	8 6 9	6/6	5/6
British Aluminium	£1	48/9	−5/-	12	12	4 18 3	71/3	48/9
Brit. Elec. Traction: Def. Ord. "A"	5/-	20/9	−2/3	22½	25	6 0 6	25/-	17/-
B.I. Callender's	£1	42/3	−5/6	12½	12½	5 18 3	55/-	42/3
B.I. Callender's 6% Pref. ...	£1	19/-	−9d	6	6	6 6 3	21/9	19/-
British Tabulating...	£1	42/6	−3/3	9	9	4 4 9	56/3	42/-
British Thermostat	5/-	23/9	−2/-	25	25	5 5 3	27/6	23/9
British Vac. Cleaner	5/-	5/6		15	10	9 1 9	8/-	5/6
Brook Motors	10/-	36/3		25	25	6 18 0	37/6	30/-
Brush Group	5/-	7/9		10	Nil	—	8/-	4/6
Bulgin, A. F.	1/-	4/-	−1/-	50	40*	10 0 0	5/6	4/-
Burco Dean	5/-	12/-	−1/-	22½	20	8 6 9	14/-	8/9
Cable & Wireless: Ord.	5/-	10/9	−1/-	10	10	4 13 0	12/6	9/6
4% Loan	100	91½		4	4	4 7 6	92½	89
Chloride El. Storage "A" ...	£1	62/-	−2/-	17½	17½	5 13 0	68/9	58/-
Clarke Chapman	£1	140/-	−22/6	22½	27½	3 18 6	9	6½
Cole, E. K....	5/-	17/6	−1/9	17½	17½	5 0 0	23/6	16/6
Cossor, A. C.	5/-	5/9	−9d	Nil	2½	2 3 6	7/3	5/9
Crabtree	10/-	23/6	−2/-	20	20	8 10 3	26/-	23/3
Crompton Parkinson Ord. ...	5/-	16/6		16	16	4 17 0	17/9	14/6
De La Rue	5/-	23/3	−1/-	30	35	7 10 6	24/9	16/3
Decca "A"	4/-	23/9	−4/3	43¾	43¾	7 7 3	32/3	23/9
Desoutter	5/-	34/6	−1/-	30	32½	4 14 3	35/6	27/6
Dewhurst	2/-	6/6	−1/3	30	16½*	5 0 0	7/9	5/9
Dictograph Tel.	2/-	5/6	−3d	20	20	—	6/3	5/6
Dubilier Condenser	1/-	3/6x.c.		30	30	—	5/-	3/6
Duport	5/-	20/-	−9d	23	25	6 5 0	21/-	17/6
E.M.I.	10/-	30/9	−3/3	15	15	4 17 6	36/-	23/9
Electrical Components	5/-	7/6	−6d	25	12½*	8 6 9	8/-	6/6
Elec. Construction	£1	23/9	−1/3	8½	8½	7 3 3	27/6	21/9
Elliott Bros.	5/-	26/3	−2/6	17½	20	3 16 3	33/6	26/3
Enfield Cable Ord.	£1	15/-	−1/-	Nil	Nil	Nil	21/6	13/-
English Electric	£1	52/6	−7/6	12½	14	5 6 9	65/-	47/6
English Electric 3½% Pref. ...	£1	11/3	−9d	3¾	3¾	6 13 3	14/3	11/3
Ericsson Tel.	5/-	42/3	−5/3	20†	22†	2 12 0†	50/-	33/3
Ever Ready	5/-	15/9	−2/6	35	37½	5 19 0*	20/-	15/-
Falk Stadelmann	£1	37/-	−1/3	17½	17½	9 9 3	40/6	35/-

The above quotations are based upon middle prices in the Stock Exchange Daily Official List.
* After scrip issue. † Free of income tax. ‡ Dividend indicated.

money invested at these prices) upon their eventual repayment. Allowing for this, the "redemption yields" work out at nearly 6 per cent. On the 4¼ and 4½ per cent British Electricity stocks the current yields now exceed 5 per cent, and here also there is the assurance of large, although not equally substantial, capital profits at the time of their redemption.

Dubilier Issue

Approval was given at last week's meetings of Dubilier Condenser to the issue of a one-for-two scrip issue through the capitalisation of £108,000 of the reserves, which have reached very ample proportions as a result of the company's consistently conservative financial policy. This operation raises the issued ordinary capital to £323,000 and brings it into better alignment with the net assets of well over a million appearing in the latest balance-sheet, which was notably strong also in cash and other liquid assets. Profits for 1956–57 showed some reduction on the high figure of the previous year, but provided fully fourfold cover for the 30 per cent dividend: in that connection the chairman advised shareholders not to assume any increase in the amount of the distribution as a sequel to the issue. Sales in the first quarter of the current year were stated to have been slightly above last year's. The 1s shares were quoted officially at 3s 6d, ex the capitalisation issue.

Electrical Investments

Company or Board	Nom. Value	Middle price 23rd Sept.	Week's Rise or Fall	Dividend Previous	Dividend Last	Yield %	1957 Highest	1957 Lowest
Electrical Shares—continued						£ s d		
G.E.C. Ord.	£1	43/9	−2/6	14	12½	5 14 3	58/9	43/9
G.E.C. 6½ Pref.	£1	19/6	−1/-	6½	6½	6 13 3	23/6	19/6
General Cables	5/-	15/-	−6d	30	30	10 0 0	15/6	11/6
Greenwood & Batley	£1	50/-		17½	17½	7 0 0	50/-	45/3
Hackbridge Holdings	5/-	12/-	−1/-	30	20	8 6 9	21/9	12/-
Hackbridge & Hewittic	5/-	11/3	−2/6	23	20	8 17 9	16/-	11/3
Head Wrightson	£1	126/3	−8/9	20	22½	3 11 3	146/3	112/6
Heatrae	2/-	4/9		15	15	6 6 6	4/9	4/-
Henley's	10/-	14/-	−3d	11½	11½	8 4 3	17/-	14/-
Holophane	5/-	22/-	−1/9	30	30	6 16 3	26/3	17/-
Hoover	5/-	31/3	−5/6	50	50	8 0 0	44/-	24/9
I.C.I.	£1	39/-	−1/9	10	10	5 2 6	46/6	37/9
Intl. Combustion	5/-	23/-	−2/-	20	22½	4 17 9	30/-	20/-
Johnson & Phillips	£1	23/3	−6d	15	10	8 12 0	34/6	23/3
Lancashire Dynamo	£1	37/6	−2/6	11	11	5 17 0	45/-	36/9
Laurence, Scott	5/-	16/3	−1/-	15	15	4 12 3	19/9	13/9
Lister, R. A.	£1	28/9	−1/3	10	10	6 19 3	33/9	26/9
London Elec. Wire	£1	43/9	−2/6	12½	12½	5 14 3	53/9	43/-
Lucas, J.	£1	28/9	−3/-	7½	7½	5 4 3	36/6	28/9
Marconi Marine	£1	35/-		10	10	5 14 3	37/-	31/-
Marryat & Scott	2/-	12/3	−3d	30	35	5 14 3	13/-	8/-
Mather & Platt	£1	58/3		15	15	5 3 0	63/9	51/3
Metal Industries	£1	25/6	−2/-	Nil	9	7 1 3	30/-	20/3
Midland Elec. Mfg.	£1	50/-	−2/6	12½	12½	5 0 0	52/6	45/-
Morphy-Richards	4/-	16/3	−1/3	50	50	4 18 6*	20/-	11/9
Murex	£1	66/9	−2/3	20	20	5 19 9	79/6	65/-
Newman Ind.	2/-	2/9		10	10	7 5 6	2/9	2/1
Oldham & Son	1/-	2/9	−3d	17½	17½	6 7 3	3/-	2/3
Parnall (Yate)	5/-	6/9	−9d	12	12	8 17 9	8/9	5/9
Parsons, C. A.	£1	57/6x.d.	−5/9	8½	7½*‡	—	71/3	50/6
Plessey	10/-	66/3	−7/3	27½	30	4 10 6	86/3	61/-
Pye "A" Deferred	5/-	13/3	−3/9	12½	12½	4 14 3	20/-	13/3
Reyrolle	£1	85/- x.d.	−9/3	16½	17½	4 2 3	110/-	90/-
Rheostatic	4/-	8/9	−3d	18½	12½*	5 14 3	10/-	8/9
Richardsons Westgarth	5/-	16/-	−1/9	16¾	16¾	5 4 3	20/-	16/-
Scottish Cables	4/-	17/3	−6d	27½	27½	6 7 6	19/3	15/-
Simon-Carves	5/-	28/9	−2/6	28¾	20*	3 9 6	36/3	26/-
Smith (England), S.	4/-	14/6	−1/-	17½	17½	4 16 6	15/9	13/-
Southern Areas	£1	12/6	−2/-	7½	7½	12 0 0	20/-	12/6
Strand Elec.	5/-	6/9	−6d	15	15	11 2 3	8/-	6/9
Sturtevant	5/-	22/9	−6d	15†	15†	3 6 0†	27/-	22/9
Sun Elec.	£1	43/9		20	25	11 8 6	43/9	43/9
Switchgear & Cowans	5/-	13/-		25	25	9 12 3	15/6	13/6
Taylor Tunnicliff	5/-	11/9	−6d	15	15	6 7 9	13/9	11/9
T.C.C.	10/-	41/3		25	25	6 1 3	41/3	35/-
T.C. & M.	£1	24/6	−2/-	8½	8½	6 18 9	31/-	24/6
Telephone Mfg.	5/-	5/6		10	10	9 1 9	8/-	5/6
Telephone Rentals	5/-	10/6	−9d	12½	12½	5 19 0	12/6	10/3
Thompson (John)	5/-	27/-x.d.	−2/9	25	25	4 12 6	37/-	27/-
Thorn Elec.	5/-	18/9	−5/9	15	17½	4 13 3	26/3	16/3
Thornycroft	£1	26/3		15	12½	9 10 6	37/6	25/-
Tube Investments	£1	61/3	−6/3	22½	15*‡	4 18 0	70/-	58/3
Vactric	5/-	18/9	−1/3	17½	25	6 13 3	23/9	12/9
Veritys	5/-	8/6	−6d	12½	12½	7 7 0	9/3	8/-
Walsall Conduits	4/-	12/9x.d.	−3d	20	20	6 5 6	15/-	11/-
Ward & Goldstone	5/-	26/3	−1/3	35	40	3 16 3*	29/-	18/6
Watford	2/-	6/6		25	25	7 13 9	6/9	6/3
Westinghouse	£1	32/6	−5/-	18	9‡	5 10 9	41/3	32/6
West, Allen	5/-	11/3	−3d	15	15	—	13/6	9/6
Wolf Electric	5/-	10/6		20	20	4 15 3*	13/9	8/9

S. Bird Interim

After the announcement of an interim dividend of 10 per cent, the 4s ordinary shares of Sydney S. Bird had been marked up to their best price of the year at 9s 6d. Although the price came back later to 8s 6d x.d., the shares were still worth double their value in the early part of this year. They came into favour last April with the publication of the 1956 results, which included a high level of earnings, an increase in the single dividend from 15 to 20 per cent and a one-for-four scrip issue. Since the 10 per cent interim dividend now declared applies to the increased capital, it was taken in the market to imply the likelihood of a further increase in the amount of the total distribution for this year. Maintenance of the rate at the full 20 per cent would put the shares on a yield basis of over 9 per cent. A statement from the directors reports improved trading results in the first eight months of this year, which runs to December.

Head Wrightson Issue

Reactions to Head Wrightson's notice that Treasury consent has been obtained for a scrip issue, in the proportion of one new share for every two held, were lost in the subsequent market disturbance. It is also the company's intention to split the denomination of the shares from £1 to 5s, a move which can be expected to broaden appreciably their marketability and investment appeal. The scrip issue will involve the capitalisation of £591,000 of the revenue reserves, which appeared in the last consolidated balance-sheet at a total of about £2¼ million, supporting issued ordinary capital of £1·2 million. On the larger capital the directors expect to declare for the year dividends totalling not less than 15 per cent, which would be equivalent to the distribution for 1956. That payment was covered four times over by available earnings.

REPORTS and DIVIDENDS

The Telegraph Construction & Maintenance Co., Ltd., has announced an interim dividend of 3¾ per cent (unchanged). In making the announcement, the directors report that the group earnings for the first half of the year amount to £404,000, as compared with £337,000 for the corresponding period of 1956. For the second half of 1956 the earnings were £378,000. After deducting depreciation, research and development expenditure and interest on unsecured loan stock, the trading surplus for January-June this year is £204,000 (against £141,000 for January-June, 1956). The trading surplus for the year 1956 was £299,216, plus non-trading income of £196,903. The directors say that the figures for the past half-year exclude non-trading income, a large proportion of which is receivable in the second half-year. They do not anticipate that it will differ materially from that received in 1956.

Powell Duffryn, Ltd.—Referring to the company's subsidiaries at the annual meeting on 19th September, the chairman (Sir Henry Wilson Smith) said that Powell Duffryn Carbon Products had a part to play in the atomic power programme. Already that company had been appointed as sub-contractor for graphite machining by the General Electric Co. in connection with the station which it was building for the South of Scotland Electricity Board. That machining work was likely to expand during the coming years; the company had not embarked upon the manufacture of nuclear graphite nor had authority been given for large-scale expenditure in that respect. Carbon Products was, however, undertaking certain work of a research and development character on manufacturing problems, though it was as yet too soon to say whether it would proceed beyond that stage.

Strand Electric Holdings, Ltd., reports a group profit for the year ended 30th April last of £46,379, as compared with £60,536 for 1955-56, and after providing for taxation, the net surplus is £21,513 (£30,888). The dividend for the year is maintained at 15 per cent.

Simms Motor Units, Ltd., is making an offer to acquire the £250,000 issued ordinary capital of the Motor & Electronics Corporation, Ltd., on the basis of one 5s ordinary share of Simms for every seven 1s units of Motor & Electronics.

The Nigerian Electricity Supply Corporation, Ltd.—The annual meeting was held on 17th September. In his circulated review of the past year, Mr. G. Hemmant (chairman) said that sales of electricity totalled 72·2 million kWh, as compared with 64·2 million in the previous year. Bulk sales to the Electricity Corporation of Nigeria increased by 9 per cent and now represented 12 per cent of their total power sales. To meet the increased demand for electricity it had been decided to construct a second dam in the Tenti area, and an application had been made to the Government for a title to the necessary land in order to enable them to commence construction at as early a date as possible.

Sydney S. Bird & Sons, Ltd., have declared an interim dividend of 10 per cent on capital increased by a one-for-four scrip issue. For the previous year there was a single payment of 20 per cent on the smaller capital. The directors state that the interim dividend reflects the improved trading results during the first eight months of the current year.

Bennis Combustion, Ltd. — The group net profit for the year ended 30th April last, after deducting £28,250 for taxation, is £23,024, as compared with £23,586 for the preceding year. It is proposed to pay a final dividend of 12½ per cent (against 10 per cent), maintaining the distribution for the year at 15 per cent.

The Pulsometer Engineering Co., Ltd., is paying an interim dividend of 10 per cent (unchanged) on increased capital.

T. Clarke & Co., Ltd., have declared an interim dividend of 8 per cent (unchanged).

New Companies

F. E. Hayter & Co., Ltd.—Registered 22nd August. Capital £1,000. Electrical engineers and contractors, etc. Directors: F. E. Hayter and Mrs. Audrey M. Hayter. Regd. office: 204, Battersea Park Road, S.W.11.

Finchley Electrovision, Ltd.—Registered 22nd August. Capital £100. Electrical engineers and manufacturers of and dealers in radio, television and electrical and scientific apparatus, etc. Directors: D. P. Lucas and D. R. J. Weatherston. Regd. office: 135, Long Lane, Finchley, N.3.

Emmanemm Lifts, Ltd.—Registered 29th August. Capital £1,000. Manufacturers of and dealers in elevators, hoists, lifts, etc. Directors: S. H. Porcas and A. J. Andrews. Regd. office: 94-6, Commercial Street, E.1.

Hydraulectric Enterprises, Ltd.—Registered 29th August. Capital £1,000. To acquire patents, and to carry on the business of general engineers, etc. Directors: C. Waller and Mabel Ball. Regd. office: 27, Fitzroy Square, W.1.

Stanley Rowland Electrical Co., Ltd.—Registered 12th July. Capital £100. Electrical engineers and contractors, etc. Regd. office: 77, Wimpole Street, W.1.

Dorian Electrical, Ltd.—Registered 15th August. Capital £100. Electricians, mechanical engineers, manufacturers of electrical apparatus, etc. Directors: D. J. Cox and S. Leadbetter. Solicitors: Wm. Foux & Co., 6a, Maddox Street, W.1.

Global Electrical Appliances, Ltd.—Registered 15th August. Capital £100. Manufacturers of and dealers in electrical and other equipment, etc. Directors: H. J. O'Donnell and Margaret M. O'Donnell. Regd. office: 16, South Ealing Road, W.5.

Visirad, Ltd.—Registered 21st August. Capital £100. Designers, manufacturers of and dealers in radio, television and telephone apparatus, etc. Directors: H. D. Milburn and E. W. Massey. Regd. office: 1, Dudley Road, Wolverhampton.

Ellis & Whitty, Ltd.—Registered 4th September. Capital £5,000. Electrical engineers and general electrical installation contractors, etc. Directors: T. C. Prosser, J. H. R. Ellis and J. A. Whitty. Regd. office: 96, St. Helen's Avenue, Swansea.

Goldwyn-Bernard, Ltd.—Registered 4th September. Capital £100. Manufacturers of and dealers in electrical goods of all kinds, radio and television receivers, etc. Directors: B. Gale and Doris Gale. Regd. office: 20, Bardon Chambers, Infirmary Street, Leeds, 1.

T.V. (B'ham), Ltd.—Registered 10th September. Capital £100. Electricians, radio, television, telephonic and telegraphic engineers, electrical and electronic engineers, etc. Directors: R. C. Slater and W. R. Browning. Regd. office: 151, Ladypool Road, Sparkbrook, Birmingham.

General Electrical Products (Swansea), Ltd.—Registered 9th September. Capital £1,000. Manufacturers of and dealers in electrical goods of all kinds, etc. Directors: L. G. C. Simpson and W. J. Spark. Regd. office: 80, Vivian Road, Sketty, Swansea.

Power Cables, Ltd.—Registered 6th September. Capital £2,000. Erecting, laying, fixing, installing, jonting and dealing in electrical cables, etc. Directors: W. J. Blowers and N. E. Freeman. Solicitors: Denton Hall & Burgin, W.C.1.

Miles Electronics, Ltd.—Registered 6th September. Capital £20,000. Mechanical, electronic, electrical and nucleonic and general engineers, etc. Solicitors: Daybell, Watts-Jones & Co., 4, New Square, W.C.2; and Theodore Goddard & Co., W.C.2.

Marriott & Shaw, Ltd.—Registered 10th September. Capital £500. Designers and manufacturers of and dealers in radio, television and electrical apparatus, etc. Directors: G. B. Shaw and R. S. Marriott. Regd. office: 17, Henshaw Road, Wellingborough.

Increase of Capital

Small Electric Motors, Ltd.—Increased by £68,000 in 1s ordinary shares, beyond the registered capital of £160,000.

Liquidations

Quality Equipment Designers, Ltd., radio and television retailers and electrical contractors, 101, Hatton Garden, London, E.C.1.—Winding up voluntarily. Liquidator, Mr. N. W. Osborne, Bank Chambers, 1, John Street, Bedford Row, London, W.C.1, appointed 5th September.

William G. Myson, Ltd., radio and television traders, 312, Biscot Road, Luton, Beds.—Winding up voluntarily. Liquidator, Mr. L. I. Prager, 6, Broad Street Place, London, E.C.2, appointed 10th September.

Bancroft & Tordoff, Ltd., electrical and refrigeration engineers, 6, Sun Street, Keighley.—Winding up. Liquidator, Mr. R. W. Hellyer, 3, Eldon Place, Manningham Lane, Bradford, 1, appointed 3rd September.

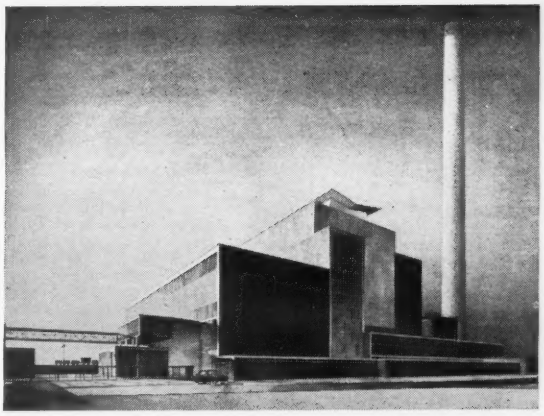
Bankruptcies

T. Anderson, lately carrying on business at 11, Rowsley Street, Keighley, Yorks, electrician.—Receiving order made 10th September on a creditor's petition.

C. V. Locke, lately residing and carrying on business as an electrical contractor under the style of Locke Electric from Newman's Yard, 1, Strawberry Vale, Twickenham, Middx, formerly residing and carrying on business from 21, The Grove, Twickenham.—Trustee, Mr. W. J. W. Hill, 58-61, York Terrace, Regent's Park, London, N.W.1, Official Receiver, released 9th September.

A. W. Arnold, carrying on business under the style of Cheriton Cycles at 25 and 27, Risborough Lane, Cheriton, Folkestone, cycle and electrical dealer.—Public examination 12th November at the Sessions House, Longport, Canterbury.

GENERATION AND DEVELOPMENT



Architect's impression of the C.E.A. North West, Merseyside and North Wales Division's new Padiham "B" power station

Padiham "B" Power Station

Construction of the Padiham "B" station in the North West, Merseyside and North Wales Division of the Central Electricity Authority (divisional controller, Mr. A. R. Cooper) is now beginning on a site adjacent to that of the "A" station on the River Calder and is due for commissioning in 1961. It will contain two 120 MW British Thomson-Houston turbo-alternators operating at steam conditions of 1,500 lb/sq in and 1,000 deg F with reheat to the initial temperature.

Each set will form a unit with a pulverised fuel-fired boiler rated at 860,000 lb/hr and suspended from the roof structure. One boiler, by Babcock & Wilcox, Ltd., will be cyclone fired and the other, by Simon-Carves, Ltd., will be of the continuous-slagging type. The molten ash will be quenched to form small granules, the flue dust being collected in electrostatic precipitators and refired to fuse with the main ash. Full-load coal consumption of each boiler will be 50 tons/hr supplied from its 1,500 ton bunker. The reinforced concrete chimney will be 450ft high with an internal diameter of 21ft at the top.

Two 3½ million gal/hr cooling towers will be erected. The walls up to 36ft from the ground are to be faced with precast concrete and above that height ribbed aluminium sheeting is to be used. Messrs. C. S. Allott & Son have been appointed consulting civil engineers and have retained Messrs. Cruickshank & Seward as consulting architects.

Hams Hall Brickworks

The Midlands Division of the Central Electricity Authority is to build its own brickworks at Hams Hall, Birmingham, as a means of disposing of pulverised ash from its power stations. This was announced on 16th September by Mr. R. L. Batley, divisional controller, who said it would be a pilot scheme producing about three million bricks a year.

Mr. Batley, who was addressing a meeting of the Midlands Electricity Consultative Council at Meaford power station, Stone, said that bricks had been made consisting of 80 per cent ash and 20 per cent clay. Efforts had been made to persuade brick manufacturers to use this formula but without success.

The bricks produced at Hams Hall would be used by the Division for its own building in the hope that it could convince the public that the bricks were as good as those made of clay. The specifications of the ash brick were exactly the same as the common brick and there was no difference in appearance. Bricks made of ash could be red, blue, black or green. The cost if clay was handy would be lower than the traditional brick, but if clay had to be transported the cost would be a little higher.

The cost of disposing of ash at present varied from 2s 6d to 7s a ton, which all went on to the cost of producing electricity, but it was the enormous quantities, which were increasing year by year, that worried them. Meaford power station alone produced 73,000 tons of ash a year, which would make 15 million bricks. Altogether in the Midlands Division about 1,000,000 tons of ash had to be disposed of every year.

Economic Case for All-Electric Houses

The respective merits of electricity and gas for housing schemes were outlined to a meeting of Stirling Town Council last week by deputations from the South of Scotland Electricity Board and the Scottish Gas Board. Recently the Council decided to have all-electric houses in its future development schemes.

Mr. W. N. Baird, central divisional general manager, Perth, of the Scottish Gas Board, urging reconsideration of the Council's decision, stated it was not in the Council's interest, nor that of its tenants, to have its new schemes all-electric, as this would deny to tenants freedom of choice of fuel. The matter was more than one of local consequence. Stirling's action would undoubtedly be watched by other towns. The additional cost of having double-fuel appliances would be £12 per house and the repayment on loan and interest charges over 60 years would be 3·3d per house per week.

Provost Duncan, remarking that he was disappointed in the case Mr. Baird had presented, said the Council was principally interested in the economics of the matter. Over a period of 60 years 3·3d per house per week was a very considerable amount.

Mr. J. Curtis, manager, Stirling Area, South of Scotland Electricity Board, said that in the case of a consumer using electricity the running costs were £1 less per quarter.

The Council decided to give further consideration at its October meeting to the reports submitted by the respective Boards.

Electricity in the Hebrides

The North of Scotland Hydro-Electric Board has taken electricity to Iona, using a 2,000 yd long submarine cable from Mull to a point north of Iona Abbey. The island is the 25th of the Hebrides to be linked under the scheme designed to provide power for the inner islands. Power is generated at Tobermory, partly by hydro sources but mainly by diesel plant, and transmitted 50 miles over Mull to a point opposite Iona. The switching-on ceremony was carried out by Mrs. Walter Elliot on 21st September before a company of 120 guests taken by the Board in a specially chartered steamer to the island.

In summarising the Board's achievements, Mr. Thomas Johnston, chairman of the Board, stated that already 85 per cent of the potential consumers in the Board's area were connected, and 58 per cent of all the farmers and crofters were receiving a supply.

After the switching-on ceremony Mrs. Elliot received from Sir Hugh Mackenzie, deputy chairman of the Board, a food mixer as a memento of the occasion.

Wakefield "B" Inauguration

The new Wakefield "B" power station, on the south bank of the River Calder, will be opened to-day (Friday) by the Mayor of Wakefield (Councillor M. Fitzpatrick), accompanied by the Mayoress (Mrs. V. Wright).

New Bulk Supply Point at Bath

A 33 kV bulk supply point to improve supplies of electricity to Bath and its north-eastern outskirts was switched on at Batheaston on Sunday.

Mr. R. W. Steel, district manager, said last week that the new bulk supply point, erected at a cost of £37,000, was planned to meet the ever-growing demand for more electricity in Bath, and at St. Catherine's, Batheaston, and Tadwick, where construction work was going ahead to bring new supplies to that area.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (3s 6d each including postage) will be obtainable after 2nd October from the Patent Office, 25 Southampton Buildings, London, W.C.2.

1952

14217. Bertele, H. C.—Mercury vapour electric-discharge apparatus. 28th May, 1953. (783773.)

16396. Superheater Co., Ltd., and Hartwell-Beavis, M. — Regenerative heat exchangers. 23rd December, 1954. (783877.)

26800. Elliott Bros. (London), Ltd.—Apparatus for generating coded patterns of electric pulses. 26th October, 1953. (784127.)

1953

1878. Telephone Manufacturing Co., Ltd.—Clock systems. 1st March, 1954. (784077.)

9726. Electric & Musical Industries, Ltd.—Electron discharge devices employing cavity resonators. 23rd March, 1954. (783775.)

20367. General Electric Co., Ltd., and Bryer, R. F.—Apparatus for use in serial radiography. 20th July, 1954. (783851.)

20369. Apparatus for radiography. 20th July, 1954. (783852.)

24059. British Telecommunications Research, Ltd.—Electrical signalling systems. 11th August, 1954. (784129.)

26939. Electro Mechanical Manufacturing Co., Ltd.—Enclosed electrical gear. 31st December, 1954. (783957.)

31311. Yardney International Corporation.—Electric accumulators. 11th November, 1953. (783958.)

35319. Conradty, E. K., Conradty, P., Conradty, M., and Conradty, C.—Arc lamp projectors. 18th December, 1953. (784131.)

1954

1184. Oberländer, H. M.—Radio receivers. 15th January, 1954. (784133.)

1463. British Thomson-Houston Co., Ltd.—Apparatus for generating a flow of gaseous working fluid for a prime mover. 16th December, 1954. (784121.)

5473. General Electric Co.—Washing machines. 24th February, 1954. (783777.)

6953. National Research Development Corporation.—Earth-leakage circuit-breakers. 10th March, 1955. (783962.)

16429. Negromanti, A. — Electrically heated fabrics, particularly suitable for pads and blankets. 31st May, 1955. (783883.)

17752. Simplex Electric Co., Ltd.—Snap-action electric circuit interrupting devices. 16th June, 1955. (783885.)

18484. Marconi's Wireless Telegraph Co., Ltd.—Mountings for coil assemblies for television and other cathode-ray tubes. 3rd June, 1955. (783781.)

21024. Ardente Acoustic Laboratories, Ltd.—Electrical control components. 13th July, 1955. (783782.)

21027. British Thomson-Houston Co., Ltd.—Automatic machine tools. 19th October, 1955. (784080.)

21136. General Electric Co., Ltd., and Bryer, R. F.—Electric motor control systems. 20th July, 1955. (783853.)

23199. Cutler-Hammer, Inc.—Sealing of actuator openings of electric switches. 10th August, 1954. (783966.)

23367. Muirhead & Co., Ltd.—Thermionic voltmeter for alternating voltages. 12th August, 1954. (783967.)

23653. Smith & Sons (England), Ltd., S.—Thermostatically controlled valves. 15th August, 1955. (783968.)

25781. Hazeltine Corporation.—Image reproducing system for a colour television receiver. 6th September, 1954. (784055.)

26261.—Marconi's Wireless Telegraph Co., Ltd.—Voltage comparator and like circuits. 6th June, 1955. (783889.)

26964. Westinghouse Brake & Signal Co., Ltd., Peter, L. H., and Venning, C. F. D.—Relay route setting systems for railways. 26th August, 1955. (783930.)

28173. Standard Telephones & Cables, Ltd. (International Standard Electric Corporation).—Magnetron anode-cathode structure. 30th September, 1954. (783786.)

30302. Casella (Electronics), Ltd.—Counting, size ascertainment, density measurement or other examination of objects. 21st October, 1955. (784144.)

34287. Hoover, Ltd.—Squeeze dryers. 18th November, 1955. (784151.)

34588. Soc. d'Electronique et d'Automatisme.—Electronic switching means. 29th November, 1954. (783895.)

1955

46. Marconi's Wireless Telegraph Co., Ltd.—Reducing the effect of interfering pulses in pulse signal systems. 28th September, 1955. (783792.)

989. British Thomson-Houston Co., Ltd.—Apparatus for generating a flow of gaseous working fluid for a prime mover. 6th January, 1956. (Addition to 784121.) (784122.)

1621. English Electric Co., Ltd.—Magnetic recording or reproducing heads. 13th January, 1956. (Cognate application 1622, 19th January, 1955.) (783794.)

2539. British Insulated Callender's Cables, Ltd.—Electric cables and insulated wires. 26th January, 1956. (Addition to 766802.) (784161.)

3231. Flight Refuelling, Ltd., and Jones, E. C.—Electric switches and magnetic operating means therefor. 25th January, 1956. (784163.)

4371. British Insulated Callender's Cables, Ltd.—Means for supporting an electric conductor or other article from an overhead wire or cable. 14th February, 1956. (783796.)

4594. Marconi's Wireless Telegraph Co., Ltd.—Cathode-ray tube deflection systems. 11th October, 1955. (783899.)

6020. English Electric Co., Ltd. — Hydraulic turbines. 28th February, 1956. (783798.)

6645. Stichting Reactor Centrum Nederland.—Process and apparatus for carrying out nuclear fission reactions. 7th March, 1955. (783985.)

7116. English Electric Co., Ltd.—Servo-mechanical control of magnetic recording or reproducing systems. 8th March, 1956. (784095.)

7216. Zahnradfabrik Friedrichshafen Akt.-Ges.—Trolley-buses. 11th March, 1955. (783903.)

9878. Chromatic Television Laboratories, Inc.—Electrode construction for cathode-ray tubes. 5th April, 1955. (784167.)

10128. Compagnie Générale de Télégraphie sans Fil.—Barium titanate high dielectric constant ceramic material and process of making same. 6th April, 1955. (783996.)

11336. Bloch, W. E. H.—Low dielectric loss materials with substantially reduced magnesium compounds and higher clay content. 16th April, 1956. (783997.)

12045. General Electric Co.—Insulation for electrical conductors. 26th April, 1955. (784170.)

12178. General Electric Co.—Electroplating of molybdenum, tungsten and alloys thereof. 27th April, 1955. (783807.)

12820. Wellman Smith Owen Engineering Corporation, Ltd.—Dynamo electric machines which may also be employed as dynamo electric couplings and dynamometers. 3rd May, 1956. (784099.)

15600. Schreyer, E. P.—Electric dry shavers. 31st May, 1955. (783811.)

16316. Camzi, J. P.—Devices for fastening electric cables, particularly to plug and socket contacts. 7th June, 1955. (784003.)

16343. Philips Electrical Industries, Ltd.—Solid-state image intensifiers. 7th June, 1955. (783812.)

16344. Philips Electrical Industries, Ltd.—Electro-luminescent radiation amplifiers. 7th June, 1955. (783914.)

16669. Brown, W. J.—Electrical control systems. 9th June, 1955. (784103.)

19037. Dorman & Smith, Ltd.—Electric circuit-breakers. 14th February, 1956. (784006.) 19916. Distribution boxes for electric circuit-breakers. 22nd May, 1956. (783815.)

19389. International Business Machines Corporation.—Magnetic memory system. 5th July, 1955. (783918.)

20556. Research Corporation.—High voltage regulating systems for electrostatic precipitators. 15th July, 1955. (783922.)

21007. Philips Electrical Industries, Ltd.—Semi-conductor devices. 20th July, 1955. (783923.)

21830. Research Corporation.—Voltage control and rectifying systems. 28th July, 1955. (783818.)

22670. Allis-Chalmers Manufacturing Co.—Regulating system for an alternator with exciter field winding in series with alternator field winding. 5th August, 1955. (784177.)

22947. Veb C. Zeiss Jena.—Electron microscopes. 9th August, 1955. (784106.)

25285. Standard Telephones & Cables, Ltd.—Impedance transformation arrangement for very high frequencies. 2nd September, 1955. (784018.)

27236. General Electric Co.—Control of electric fans. 23rd September, 1955. (783931.)

30061. Picard, M.—Headlamps and projectors. 20th October, 1955. (784024.)

31879. Westinghouse Electric International Co.—Magnetic amplifiers. 8th November, 1955. (784027.)

34017. Standard Telephones & Cables, Ltd.—Automatic metering of calls in telecommunication exchanges. 28th November, 1955. (783941.)

35019. Smith & Sons (England), Ltd., S. (Eaton Manufacturing Co.).—Magnetic clutch drive. 6th December, 1955. (784192.)

35781. Hazeltine Corporation.—Colour television signal translating apparatus. 13th December, 1955. (784114.)

35825. Spurrier, F. R.—Hollow air cooled sheet metal turbine blade. 13th December, 1955. (784196.)

36374. Telefonaktiebolaget L. M. Ericsson.—Signalling system for telephone coin box apparatus. 19th December, 1955. (784032.)

36875. Ericsson Telephones, Ltd.—Electronic counting arrangements. 23rd December, 1955. (784033.)

37296. Landis & Gyr Akt.-Ges.—Counting mechanism for meters. 29th December, 1955. (784034.)

1956

159. Western Electric Co., Inc.—Electric control circuits. 3rd January 1956. (783835.)

2468. Western Electric Co. Inc.—Cathode structure for magnetrons. 25th January, 1956. (783836.)

3837. Höhn, R.—Flexible multi-strand electrical conductors. 7th February, 1956. (Addition to 765412.) (784036.)

4254. General Electric Co.—Polyethylene and articles made therefrom. 10th February, 1956. (784037.)

5495. Western Electric Co., Inc.—Electromagnetic relays. 22nd February, 1956. (784116.)

6463. Fioravanti, J. E. F.—Electric insulators. 1st March, 1956. (Addition to 726171.) (784043.)

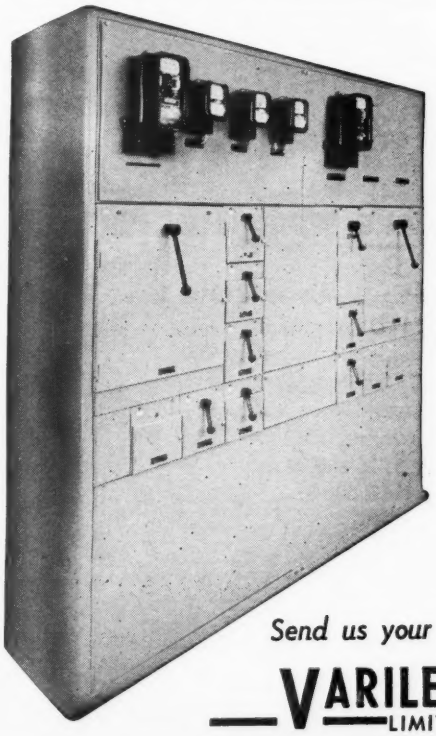
7779. Allmänna Svenska Elektriska Aktiebolaget.—Oil circuit-breaker with two extinguishing chambers. 13th March, 1956. (784045.)

15297. Hazeltine Corporation.—Image reproducing system for a colour television receiver. 6th September, 1954. (784056.)

15298. Chrominance subcarrier component selection system. 6th September, 1954. (Divided out of 784055.) (784057.)

Cubicle Switchboards

by VARILECTRIC



UNIT CONSTRUCTION

embodying Combination Fused Switches from our ASTA Type Tested 30 MVA range. 60 amperes to 750 amperes. Standardised dimensions permit ease of assembly. Great flexibility of layout and facilities for extensions.

Our other products include:—

- RISING MAIN SYSTEMS
- CABLE TRUNKING SYSTEMS
- OVERHEAD BUSBAR SYSTEMS
- DISTRIBUTION FUSEBOARDS
- COMBINED DISTRIBUTION FUSEBOARDS AND ISOLATORS

Export Inquiries invited
Specialists in meeting climatic conditions

Send us your enquiries and problems

VARILECTRIC LIMITED

10 MELON ROAD, LONDON, S.E.15

Telephone: Rodney 6895/6/7

LEGG INDUSTRIES LIMITED

Legg (Industries) Limited design and manufacture Charging Equipment for Electric Vehicles and Trucks of all types and the majority of leading manufacturers specify LEGG CHARGERS for use with their equipment—both at Home and Abroad.

WHEN YOU PURCHASE A LEGG CHARGER YOU ENSURE YEARS OF RELIABLE SERVICE

Chargers are also designed and manufactured to comply with C.S.A. requirements.

Legg VEHICLE CHARGERS

LEGG (INDUSTRIES) LTD.
WILLIAMSON ST., WOLVERHAMPTON

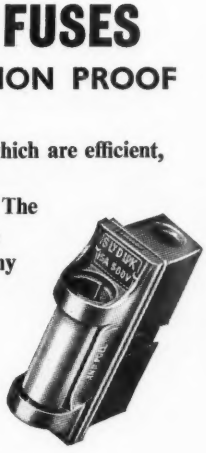
57230

VIBRATION?

–You Can Rock SLYDLOK FUSES

THEY ARE VIBRATION PROOF

Industry today demands fuses which are efficient, reliable, and will operate under adverse conditions if necessary. The SLYDLOK 'H' Type Vibration Proof Fuses meet these and many other requirements. They are available in 5, 15 and 30 amp ratings for rewirable or H.R.C. duty.



Information and supplies may be obtained ONLY direct from the manufacturers

EDWARD WILCOX & CO. LTD., WYTHENSHAWE, MANCHESTER 22

Telephone: WYThenshawe 2235
London Office: Fulwood House, Fulwood Place, W.C.1. Telephone: CHAncery 2206

dmEW91

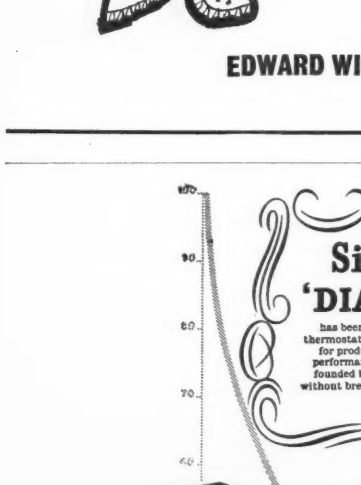
Since 1890 'DIAMOND H'

has been in the forefront of switch and thermostat design, establishing a reputation for products of exceptional quality and performance. The standard and tradition founded by Gerald Waldo Hart continues without break and with even greater success.

INTRODUCE Energy Regulators

★ Fully reciprocating mechanism—enables handle dial to be turned direct to "FULL" position from "OFF" thus by-passing simmering position.
★ Indexed "OFF" and "FULL" positions.
★ Rear wiring, shallow projection, 1ER series.
★ Rigid wiring terminals. Calibration unaffected during wiring process.
★ Greater consistency.

2½ K.W. 200/250 V. AC only, single pole, single stage Energy Regulator fitted with side wiring terminals. Interchangeable with existing types.



2½ K.W. 200/250 V. AC only, single pole, single stage Energy Regulator fitted with rear wired terminals. The shallow rearward projection (1 19/32"), makes 1ER Energy Regulators extremely attractive to designers of modern electric appliances.

'DIAMOND H' SWITCHES LTD., GUNNERSBURY AVENUE, LONDON, W.4.

TELEPHONE: CHISWICK 6444 (5 LINES) **TELEGRAMS AND CABLES: DIAMONHART, CHISK, LONDON**

NEXT WEEK'S EVENTS

Organisers of electrical functions are advised to make use of the "Electrical Review" clearing house, Room 221, Dorset House, Stamford Street, London, S.E.1, to ascertain that proposed dates for their functions do not clash with others already arranged.

Monday, 30th September

LEEDS.—Griffin Hotel, Boar Lane, 7 for 7.30 p.m. I.E.S., Leeds Centre. Annual dinner and chairman's induction.

Leeds University, 7.30 p.m. Incorporated Plant Engineers, West and East Yorkshire Branch. "The Safe Use of Electricity," by S. J. Emerson.

MANCHESTER. — Electrical Industries National Golf Championship finals at Bramhall and Stockport Golf Clubs. Annual dinner at the Midland Hotel, Manchester.

PORTSMOUTH.—College of Technology, 6.30 p.m. I.E.E., Southern Graduate and Student Section. Chairman's address, "The Use of Electricity in Agriculture," by D. W. Martin.

Tuesday, 1st October

EDINBURGH.—Carlton Hotel, North Bridge, 7 p.m. I.E.E., South-East Scotland Sub-Centre. Centre chairman's address, by E. O. Taylor.

25, Charlotte Square, 7 p.m. Incorporated Plant Engineers, Edinburgh Branch. "Practical Plant Engineering in the Chemical Industry," by C. W. Winstock.

ELTHAM.—Eltham Green School, Queenscroft Road, S.E.9, 7.15 p.m. A.S.E.E., South East London Branch. "The Work of the National Inspection Council," by E. J. Sutton.

HAMMERSMITH.—Windsor Castle Hotel, 134, King Street, 7.30 p.m. A.S.E.E., West London Branch. "M.V. Switchgear—Design and Application," by E. Jacks.

LEEDS.—C.E.A., 1, Whitehall Road, 6.30 p.m. I.E.E., North Midland Centre. Chairman's address, by A. J. Coveney.

LONDON.—At the Royal Society of Arts, John Adam Street, Adelphi, Strand, W.C.2, 7 p.m. Incorporated Plant Engineers. "Reactor Plant Engineering," by R. F. Jackson.

LOUGHBOROUGH.—The College, 6.30 p.m. I.E.E., East Midland Centre. Informal conversazione and reunion.

MANCHESTER.—Engineers' Club, 17 Albert Square, 6.30 p.m. I.E.E., North Western Centre. Chairman's address, by F. R. Perry.

NOTTINGHAM.—County Hotel, Theatre Square, 7 p.m. Incorporated Plant Engineers, East Midlands Branch. "The Heat Pump, Some Aspects of its Application," by J. A. Sumner.

PETERBOROUGH.—White Lion Hotel, Church Street, 7.30 p.m. Incorporated Plant Engineers, Peterborough Branch. "Hydro-electric Power Development," by G. C. Cummings.

READING.—Agricultural Hall, 121, Oxford Road, 7.15 p.m. A.S.E.E., Oxford, Reading and Districts Branch. "Space Flight," by Dr. L. R. Sheppard.

RUGBY.—College of Technology and Arts, 6.30 p.m. I.E.E., Rugby Graduate and Student Section. Chairman's address, by A. J. Gilbert.

STOKE-ON-TRENT.—North Stafford Hotel, 6 p.m. I.E.S., Stoke-on-Trent Group. "The Polar Auroræ," by G. E. Kemp.

Wednesday, 2nd October

BIRMINGHAM.—James Watt Memorial Institute, Great Charles Street, 7 p.m. Junior Institution of Engineers, Midland Section. Annual general meeting.

EDINBURGH.—Y.M.C.A., Social Room, 14, South St. Andrew Street, 6.15 p.m. I.E.S., Edinburgh Centre. "Lighting in the Home," by D. P. Bliss and H. Hellier.

GLASGOW.—39, Elmbank Crescent, 7 p.m. I.E.E., South-West Scotland Sub-Centre. Centre chairman's address, by E. O. Taylor.

39, Elmbank Crescent, C.2, 8 p.m. A.S.E.E., Glasgow Branch. Branch lecturettes.

HARRINGAY.—"Queen's Head," 677, Green Lanes, N.4, 7.45 p.m. A.S.E.E., North London Branch. "Electric Lifts and Equipment," by W. T. Wagon.

MANCHESTER.—Engineers' Club, Albert Square, 7 p.m. A.S.E.E., Manchester Branch. "Railway Electrification," by J. K. Lord.

NEWCASTLE-UPON-TYNE.—King's College, College Road, 1, 6.15 p.m. I.E.S., Newcastle-upon-Tyne Centre. Annual general meeting and chairman's address, by R. J. Fothergill.

PORTSMOUTH.—C.E.A., High Street, 6.30 p.m. I.E.E., Southern Centre. Chairman's address, by Dr. L. G. A. Sims.

Royal Beach Hotel, 7.30 p.m. Incorporated Plant Engineers, Southern Branch. "The Engineer and the Clean Air Act," by E. C. Rogers.

PRESTON.—At the R.A.F.A. Club, East View, 7.30 p.m. A.S.E.E., Preston Branch. "Miniature Circuit-Breakers," by H. W. Wolff.

Harris College of Further Education, Corporation Street, 7.30 p.m. Institution of Production Engineers, Preston Branch. "The Production of Nuclear Fuels for the Atomic Power Programme," by Dr. J. E. Littlechild.

STAFFORD.—Technical College, 7.15 p.m. I.E.E., North Staffs. Sub-Centre Graduate and Student Section. "Are Circuit-Breakers Really Necessary ? " by A. Davies.

SWANSEA.—Demonstration Theatre, South Wales Electricity Board, The Kingsway, 6.30 p.m. I.E.S., Swansea Group. Chairman's address, by D. B. Francis.

Wednesday, 2nd October, to Friday, 4th October

HASTINGS.—White Rock Pavilion. National Smoke Abatement Society. Annual conference.

Thursday, 3rd October

GLASGOW.—Lighting Service Bureau, 29, St. Vincent Place, 6.30 p.m. I.E.S., Glasgow Centre. "Lighting in the Home," by D. P. Bliss and H. Hellier.

LONDON.—Savoy Place, W.C.2, 5.30 p.m. Institution of Electrical Engineers. Inaugural address of the President, T. E. Goldup.

READING.—Great Western Hotel, 7.30 p.m. Institution of Production Engineers, Reading Branch. "Some Aspects of Automation," by A. L. Stuchbery.

REDDITCH.—College of Further Education, 7.30 p.m. Institution of Production Engineers, Worcester Branch. "Accurate Measurement in Engineering Production," by J. Loxham.

SOUTHAMPTON.—Polygon Hotel, 8 p.m. A.S.E.E., Southampton Branch. "Some Problems in Sound Production," by F. H. Brittain.

Friday, 4th October

ABERDEEN.—Robert Gordon's Technical College, 7.30 p.m. I.E.E., North Scotland Sub-Centre. Centre chairman's address, by E. O. Taylor.

BATH.—Royal York Hotel, 8 p.m. A.S.E.E., Bristol and West of England Branch. Film show.

COLCHESTER.—Britannia Works Canteen, Davey, Paxman & Co., Ltd., 7.30 p.m. Institution of Production Engineers, Eastern Region. "Automation—Development of Transfer Equipment," by A. J. Sephton.

LIVERPOOL.—At the Liverpool Engineering Society, 9, The Temple, 24, Dale Street, 7.30 p.m. A.S.E.E., Liverpool and District Branch. "Earthing and its Problems," by P. W. Cave.

LONDON.—Park Lane Hotel, Piccadilly, W.1, 7 for 7.30 p.m. Electrical Trades' Commercial Travellers' Association. Annual ball.

Pepys House, 14, Rochester Row, S.W.1, 7 p.m. Junior Institution of Engineers. Opening meeting.

Borough Polytechnic, Borough Road, S.E.1, 2.30 p.m. Plastics Institute. "Challenge of Plastics to the Arts and Technology," by Sir Miles Thomas.

Saturday, 5th October

AYLESBURY.—Hampden Buildings, Temple Square, 7 p.m. A.S.E.E., Oxford, Reading and Districts Branch. "The 13th Edition of the I.E.E. Wiring Regulations," by J. J. Looker.

LIVERPOOL.—The Mecca, Sefton House, Exchange Street East, 2. A.S.E.E., Liverpool and District Branch. Annual dinner and dance.

Trade Marks

APPLICATIONS have been made for the registration of the following trade marks. Objections may be entered up to 4th October:—

LUMICON. No. 743,931. Class 9. Electronic apparatus incorporating photo-electric cells for use in automatically controlling electric lighting.—J. Edward Hall (Elec. Engineers), Ltd., Clarence Road Works, Clarence Road, Leeds, 10.

VIER-ERR. No. B750,675. Class 9. Sound receiving and sound reproducing apparatus; and television apparatus.—Graetz Kommanditgesellschaft, Altena/Westfalen, Germany. Address for service, c/o Marks & Clerk, 57 & 58, Lincoln's Inn Fields, London, W.C.2.

TELEMAN. No. 763,021. Class 9. Electrical apparatus and instruments for measuring, indicating and testing; apparatus for controlling machines, engines and motors by electric current control; and parts.—English Electric Co., Ltd., Queen's House, 28, Kingsway, London, W.C.2.

No. 763,117 (design). Class 9. Electrical and scientific apparatus and instruments, etc. —Boden-Seewerk Perkin-Elmer U. Co. G.m.b.H., Ueberlingen/Bodensee, Germany. Address for service, c/o J. Longman, Jessel Chambers, 88-90, Chancery Lane, London, W.C.2.

KEWVAR. No. 765,758. Class 9. Electrical apparatus and instruments and parts; and electricity conductors.—Kent Bros. Electric Wire Co. & E. H. Phillips, Ltd., Kew Works, Broad Lane, Bracknell, Berks.

AUDIX. No. 766,446. Class 9. Scientific and electrical apparatus and instruments.—Electro Apparatus (London), Ltd., Benfield End, Stansted, Essex.

LINGADEX. No. 766,536. Class 9. Sound reproducing and recording apparatus; and sound records in the form of magnetically coated sheets.—Philips Electrical, Ltd., Century House, Shaftesbury Avenue, London, W.C.2.

HOMO. No. 756,166. Class 11. Electric furnaces (other than experimental furnaces) and work containers being parts of such furnaces; and electric ovens; all for use in the heat treatment of metals; and electric heating elements for such furnaces and for ovens.—Leeds & Northrup Co., Philadelphia, Penn., U.S.A. Address for service, c/o Mewburn Ellis & Co., 70-72, Chancery Lane, London, W.C.2.

Management of Design

The Council of Industrial Design has published "The Management of Design," an illustrated report of the International Design Congress which was held in London last September. Copies (3s 6d, 4s post free) can be obtained from the Council at 28, Haymarket, London, S.W.1.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

CONTRACTS OPEN

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses

Australia.—Electricity Commission of New South Wales, Sydney. 21st October. Substation remote supervisory and control apparatus. (E.S.B. 22877/57. Ten/28156.)*

Bushey.—U.D.C. 18th October. Street lighting scheme. (See this issue.)

Ceylon.—Tender Board, Ceylon Transport Board, Colombo. 23rd October. Batteries for buses. (E.S.B. 22388/57. Ten/28045.)*

Greece. — State Procurement Service, Athens. 1st October. Unmounted knife switches. (E.S.B. 22493/57. Ten/28050.)* 15th October. Electric cables. (E.S.B. 22497/57. Ten/28065.)*

Guatemala. — Departmento de Bienes Nacionales. 7th October. Apparatus including cables, insulators and accessories, telegraph and telephone equipment. (E.S.B. 22240/57. Ten/28036.)*

Hereford.—City Council. 14th October. Trunk road lighting equipment. (See this issue.)

India.—Kanpur Electricity Supply Administration. 5th November. One 150,000 lb/hr water tube boiler at Riverside power house, Kanpur. (E.S.B. 22556/57. Ten/28096.)*

Damodar Valley Corporation, Calcutta. 31st October. Disconnecting switches. (E.S.B. 22733/57. Ten/28139.)*

Madras State Electricity Board. 11th October. Fuse units and cut-outs. (E.S.B. 22959/57. Ten/28152.)*

Iraq.—Central Foreign Purchasing Board, Baghdad. 5th October. Telephone line copper and iron wire, tools and accessories. (E.S.B. 22503/57. Ten/28109.)* 31st October. Telegraph and telephone pole line fittings. (E.S.B. 22670/57. Ten/28122.)*

Lebanon. — Government Development Department for Hydraulic and Electricity, Beirut. 17th October. Copper conductors. (E.S.B. 22295/57.I.C.A. Ten/28071.)* Transformers. (E.S.B. 22589/57.I.C.A. Ten/28086.)* 22nd October. Glass electric insulators. (E.S.B. 22722/57. Ten/28128.)*

Rhodesia and Nyasaland.—Umtali Municipal Electricity Department. 23rd October. Three 20 kVA, two 50 kVA and one 300 kVA transformers. (E.S.B. 22486/57. Ten/28060,)* 11 kV armoured cable. (E.S.B. 22485/57. Ten/28075.)* L.v. cable. (E.S.B. 22484/57. Ten/28043.)*

Ryton (Durham).—U.D.C. 7th October. Electric lighting and heating work at 20 houses being built near Runhead Gardens, Ryton. U.D.C. surveyor.

Skelton and Brotton (Yorks).—U.D.C. 2nd October. Electrical wiring of eight houses and ten bungalows on the Saltburn Lane estate. Surveyor, Skelton-in-Cleveland.

South Africa.—Durban Corporation. 18th October. Telephone cable terminal assemblies and boxes. (E.S.B. 22662-3/57. Ten/28107-8.)* 25th October. Wall mounting street lighting fittings. (E.S.B. 22726/57. Ten/28130.)*

Stores Department, South African Railways, Johannesburg. 16th October. Battery electric tractor and battery charger. (E.S.B. 22777/57. Ten/28147.)* 18th October. Switchboards and three 400 kVA transformers. (E.S.B. 22596/57. Ten/28094.)*

United States.—Bureau of Reclamation, Denver. 10th October. Two 25,263 kVA generators for Fremont Canyon power plant. (E.S.B. 21940/57. Ten/28085.)*

Uruguay.—Ministerio de Salud Publica. 22nd October. Portable X-ray apparatus. (E.S.B. 22537/57. Ten/28117.)*

Wakefield.—City Council. 7th October. Street lighting equipment. (See this issue.)

* Specifications may be inspected at the Export Services Branch, Board of Trade, Lacon House, Theobald's Road, London, W.C.1 (Chancery 4411; extension 769).

WORK IN PROSPECT

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors

Barnehurst.—Ambulance station (£55,675); E. T. Ashley Smith, county architect, Springfield, Maidstone.

Bellingham.—Primary school (£120,000); county architect, County Hall, Newcastle-on-Tyne.

Bradford.—Four-storey block of business premises, Broadway/Charles Street site, for C. & A. Modes, Ltd., 505, Oxford Street, London, W.1.

Brighton.—Works extensions; T. S. Precision Engineering, Ltd., Crowhurst Road, Hollingbury.

Primary school, South Woodingdean; A. C. Jenkins, Ltd., builders, Barn Garage, Ladies' Mile Road.

Bromyard.—Secondary modern school; Robinson & Kay, architects, 73, Market Street, Stourbridge.

Burton-on-Trent.—Houses (250), Edge Hill estate; borough architect.

Cambridge. — Shopping arcade, St. Andrew's Street/Drummer Street site; H. C. Hughes & P. Bicknell, architects, Tunwells Court, Trumpington Street.

Chippenham.—Offices, women's hostel and other buildings at Lackham School of Agriculture, Lacock (£48,670); county architect, County Hall, Trowbidge, Wilts.

Chorley.—Houses (89); borough engineer, Town Hall, Chorley, Lancs.

Corbridge.—Modern school (£120,000); county architect, County Hall, Newcastle-on-Tyne.

Croydon.—Church of St. Edward, New Addington; E. C. Pinks & Partners, surveyors, Parliament Mansions, Victoria Street, London, S.W.1.

Laboratory block, High School for Girls, Wellesley Road; Girls' Public Day School Trust, Broadway Court, S.W.1.

Dwellings (126), Longheath estate; Carlton Contractors, Ltd., Carlton House, Ashley Road, Epsom.

Cumberland.—Secondary school (450 children), Aspatria; county architect, Portland Square, Carlisle.

Darlington.—County primary school, Aycliffe; county architect, County Hall, Durham.

Derbyshire.—Pumping station with office block and treatment works for River Dove Water Board (£158,895); J. H Fryer, Ltd., Derby.

Enfield.—Flats (44), Garfield Road; Chas. Cooke & Partners, Ltd., 4, Chase Side.

Factory, Lea Valley Road; E. Osmond, Ltd., Wharf Road, Ponders End.

Exeter.—Dwellings (103), Dunsford Road estate; Woodman & Son, Ltd., builders, 4, Bartholomew Street East.

Gosforth (Northumberland).—Houses (50), Regent Farm estate; M. J. Liddell & Sons, builders, 36, Great North Road, Newcastle.

Grangemouth.—Houses (60); burgh surveyor.

Gravesend.—Houses (132), North Cray Place estate; borough engineer, 6, Woodville Terrace.

Guisborough.—Houses (302), Hutton Lane estate; W. J. Simms, Sons & Cooke, Ltd., builders, Hadyn Road, Sherwood, Nottingham.

Hebburn (Co. Durham).—R.C. grammar/technical school, Mill Lane, for Durham C.C.; county architect, South Street, Durham.

Kettering.—Conversions at Rushton Hall to provide school for Royal National Institute for the Blind (about £90,000); Architects' Department, Ministry of Works, Abell House, John Islip Street, London, S.W.1.

Lancing.—Flats (20), Brighton Road; surveyor, Worthing R.D.C., 15, Mill Road, Worthing.

London.—Rebuilding Middlesex Hospital Medical School; Easton & Robertson, architects, 53, Bedford Square, W.C.1.

Dwellings (57), Yoakley Road, Stoke Newington; Howes & Jackman, architects, 1, Verulam Buildings, Gray's Inn, W.C.1.

Newcastle-on-Tyne.—Extensions to police headquarters (£100,000); city architect, 18, Cloth Market, Newcastle.

Factory (20,000 sq ft), White Street; Charlton, Weddle and Co., engineers, Manors Works.

Ten-storey blocks of flats, Heaton Park Road and Brunel Terrace; city architect, 18, Cloth Market.

Flats (156), Wharrier Street and Walker Road; William Leech, Ltd., builders, St. James Street.

Flats and maisonnettes (35), Fairways estate; Thomas Armstrong, Ltd., builders, 16, Robson Street.

North Riding.—Modern school at Northallerton (£104,000); R. B. A. Moody Brothers, builders, Northallerton.

Special day school at Redcar (£41,000) and high school for boys at Scarborough (£243,000); F. Shepherd & Son, builders, York.

Northumberland.—Primary school, Byrness; county architect, County Hall, Newcastle-on-Tyne.

Ockendon.—Extensions at South Ockendon Hospital (£160,000); Thurgood, Son & Chidgey, architects to Regional Hospital Board, 4, Broad Street Buildings, London, E.C.2.

Paisley.—Houses (118), George Street/Canal Street area; A. McGregor, burgh surveyor, 14, Gilmour Street.

Pelaw.—New office block for Bowran & Co., Ltd.; T. Clements & Son, Selborne Gardens, Newcastle.

Reading.—Civic centre in connection with development plan; town clerk, Town Hall.

Redhill.—Office block, London Road; G. T. Crouch, Ltd., builders, Sutherland House, Surbiton Crescent, Kingston-on-Thames.

Rotherham.—New council offices; R.D.C. surveyor, Grove Road, Moorgate.

Houses (60), Hungerhill Road; Watsons Estates, Ltd., Barber Wood House, Kimberworth.

Sedgley.—Houses (134); Brownswall Estates, Ltd., 1, Ivy House Lane, Coseley.

Swansea.—Houses (172), Brondeg; R. Moody, borough engineer, Guildhall.

Tyldesley. — Conversions at Majestic Cinema to form civic hall and swimming baths; U.D.C. surveyor, Council Offices, Tyldesley, Manchester.

West Hartlepool.—Office block, Brenda Road; Dodge & Reid, architects, 72, High Street, Brentford.

Whitley Bay.—Additions (42 bedrooms) at the Rex Hotel; H. Gatoff, architect, 51, Grainger Street, Newcastle-on-Tyne.

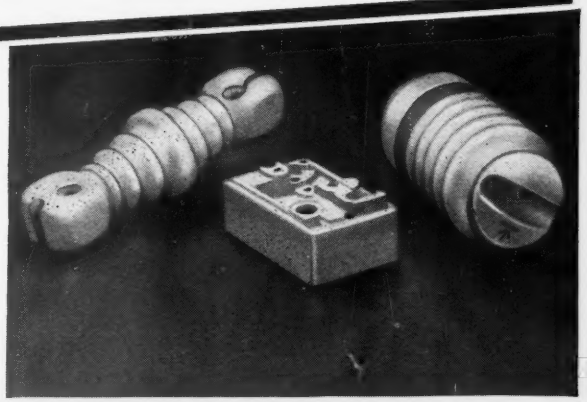
Flats (12), Blyth Road/Links Avenue; L. Netts, architect, 36, Jesmond Road, Newcastle-on-Tyne.

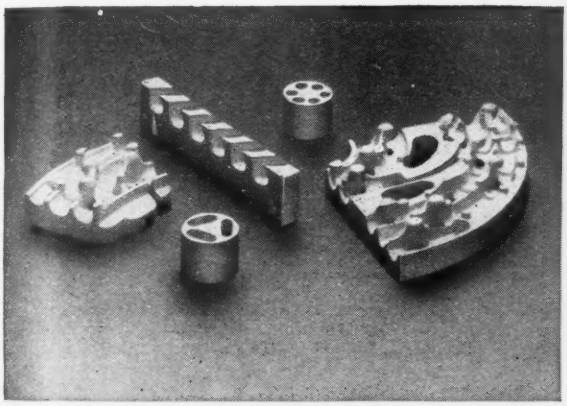
Wolverhampton.—Residential special school near Kingswood Common, Wrottesley, comprising new school and residential and medical blocks; borough engineer, Town Hall.

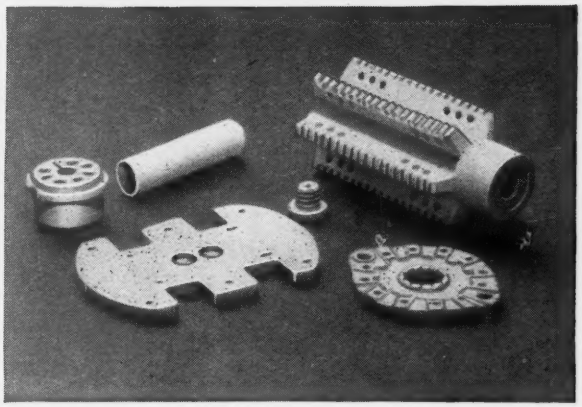
Bullers CERAMICS

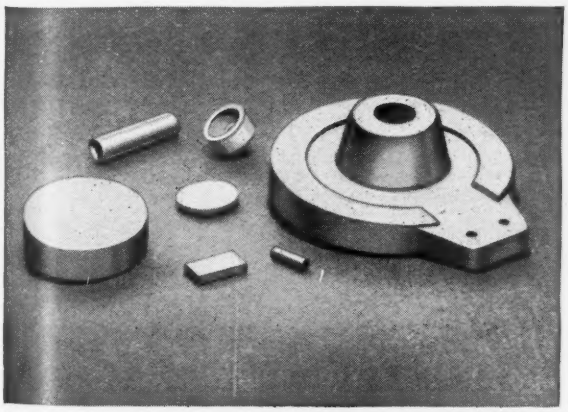
FOR INDUSTRY

High quality material and dimensional precision are attributes of Bullers die-pressed products.
Prompt delivery at competitive prices.









We specialise in the manufacture of

PORCELAIN
for general insulation

REFRACTORIES
for high-temperature insulation

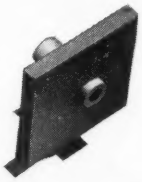
FREQUELEX
for high-frequency insulation

PERMALEX & TEMPLEX
for capacitors

BL12A

BULLERS LIMITED
MILTON · STOKE-ON-TRENT · STAFFS
Phone: Stoke-on-Trent 21381 (5 lines) · Telegrams & Cables: Bullers, Stoke-on-Trent
Ironworks: TIPTON, STAFFS Phone: Tipton 1691
London Office: 6 LAURENCE POUNTNEY HILL, E.C.4 Phone: MANsion House 9971

To illustrate the extreme hardness of SINTOX Industrial Ceramic, the photograph on the right shows a ⅛" diameter tube of SINTOX which, without even chipping, was forced through a ¼" thick mild steel plate.

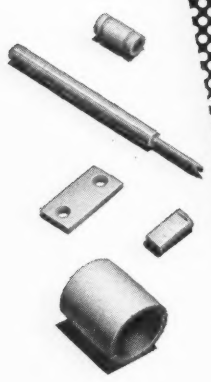


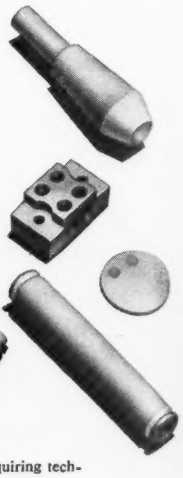
SINTOX IN THE ELECTRICAL INDUSTRY

Compared to porcelain, in tension, compression and cross breaking, SINTOX has at least twice the strength ; and insulating properties twice as good.

Electrical resistance — SINTOX is so little affected by temperatures that at 300°C. it is about one million times that of porcelain. Thermal conductivity twenty times better than porcelain — almost comparable with steel.

SINTOX has already many applications in the electronics field. For instance, for formers in place of traditional wire-wound resistors and in the repeaters used for the Trans-Atlantic cable. Other applications in the electrical industry are legion.





THE HARD CERAMIC SINTOX

STAS

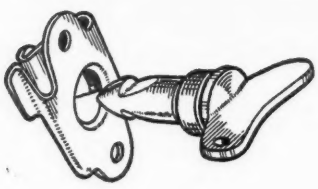
Sintox Technical Advisory Service

This service is freely available without obligation to those requiring technical advice on the application of Sintox Industrial Ceramics. Please write for booklet or any information required enclosing blueprint if available.

SINTOX IS MANUFACTURED BY **LODGE PLUGS LTD., RUGBY**

AXON AXON MOTOR RE-WINDING CO. LTD.
536 MOSELEY ROAD
BIRMINGHAM 12
Tel.: CALthorpe 0774

ODDIE FASTENERS



The Fastener with endless applications. Simple, Positive, Self-locking. Made in a variety of types and sizes.

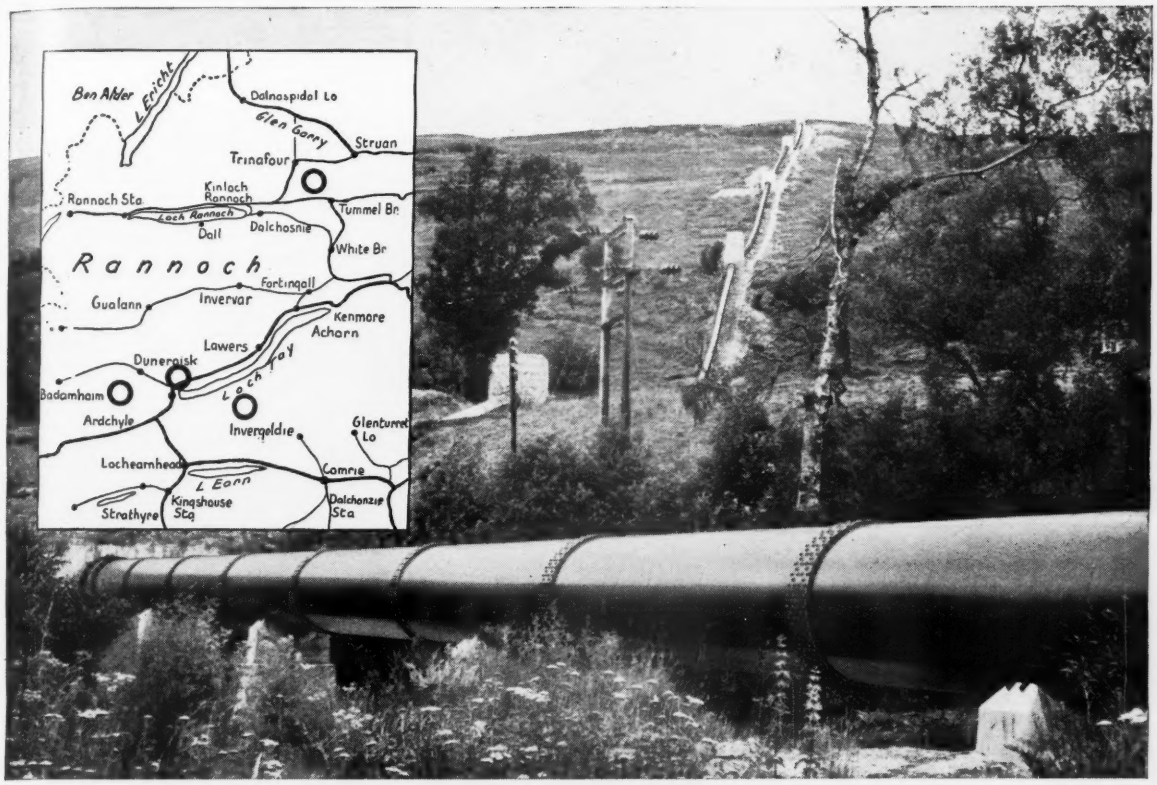
Special Fasteners to suit customers' requirements

WIDELY USED IN THE ELECTRICAL AND RADIO INDUSTRY

Department "E.R."

ODDIE, BRADBURY & CULL LTD.
SOUTHAMPTON

Telephone 55883 *Cables: "Fasteners, Southampton"*



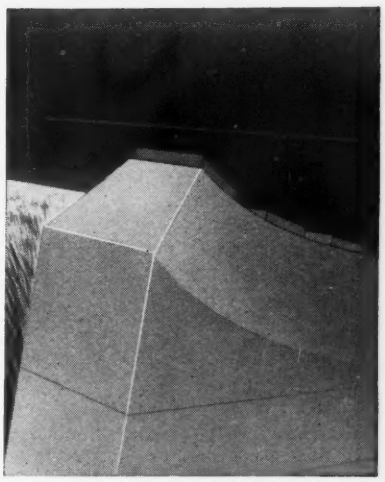
Tufnol pays the piper...

Up at Lawers in Perthshire, and other places where pipelines of the North of Scotland Hydro-Electric scheme run, engineers have exploited the advantages of Tufnol for bearing pads to support the pipelines. Many of the pads have already given several years of satisfactory service for, due to its inherent physical properties, Tufnol is the ideal bearing material for pipelines.

Firstly, Tufnol is a high grade electrical insulator and therefore helps to prevent corrosion inside the pipes caused by electrolytic action.

Secondly, its mechanical strength enables Tufnol to bear the full weight of the pipes, even though some of them are more than 7 feet in diameter.

Thirdly, since Tufnol is sympathetic in contact with other materials, wear at the points of support is reduced to a minimum when the pipes expand or contract. Further, because of Tufnol's hardwearing qualities the pads themselves are little affected by this movement of the pipes.

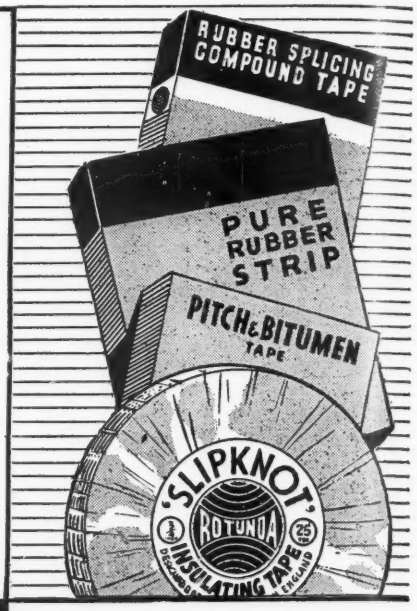


TUFNOL

REGISTERED TRADE MARK

TUFNOL LTD · PERRY BARR · BIRMINGHAM · 22B

322



Take no chances-use

ROTUNDA

INSULATING TAPES

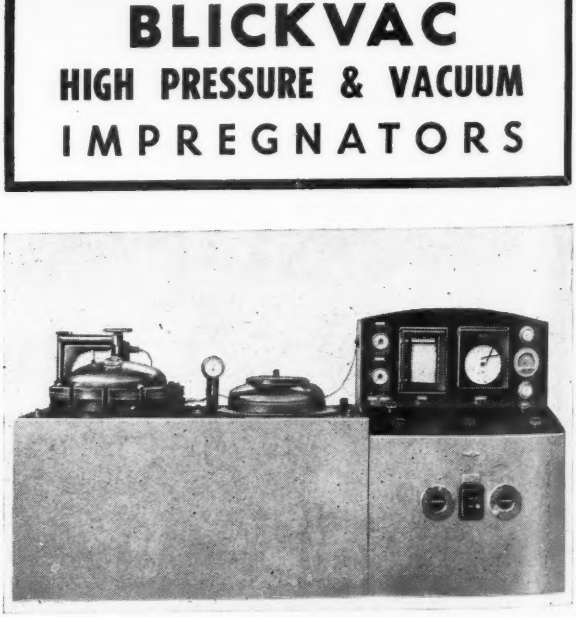
ROTUNDA LIMITED DENTON MANCHESTER

BLICKVAC

HIGH PRESSURE & VACUUM IMPREGNATORS

BLICKVAC Impregnators are used by Marconi, Pye, S. Smith & Sons, N.C.B., M.O.S. and many other well-known organisations. A full range of standard models is available — capacities 4 in. by 9 in. to 3 ft. by 3 ft. — suitable for Varnish, Wax, Potting Resins, etc. Plants can be designed for special requirements. Blickvac Impregnators are designed to give simplicity in control, outstanding performance and ease in cleaning. A second autoclave can be added at low cost when needed.

BLICKVAC products include :- Epoxy Resin Vacuum Mixing and Casting Plants, Electric Ovens, Vacuum Ovens, Mixing Vessels, Dipping Tanks, etc.



BLICKVAC ENGINEERING LTD. Bede Trading Estate, Jarrow, Co. Durham

Telephone: Jarrow 897155

LONDON OFFICE: 96/100 Aldersgate St., E.C.1

Telephone: MONarch 6256

safety first

with SIEMENS EDISWAN earth leakage circuit breakers

Three types of earth leakage circuit breakers make up the Siemens Ediswan range of these established safety switches. Voltage operated and complying with B.S. requirements, they are of improved design and ensure a wide margin of safety. Tripping mechanism is simple and robust; cases and covers give good protection against heat, cold, damp, dust and insects. For full details, please ask for catalogue Z174/57.

Types TP and TP & N Circuit Breakers

A new addition to the range intended for industrial use; suitable for 60 amp. 500v. circuit. Available with or without overload coils on each phase, and with or without neutral link. Extended terminal covers, fitted with rubber gaskets, can be supplied for use with T.R.S. cable or conduit.

Type ET.60D Circuit Breaker

Suitable for 60 amp. 250v. circuit; for use as consumers' main switch in small dwellings, especially in rural areas, and for protection of farm equipment or industrial tools. Overload protection can be supplied, and extended terminal covers, fitted with rubber gaskets, are available for use with T.R.S. cable or conduit.

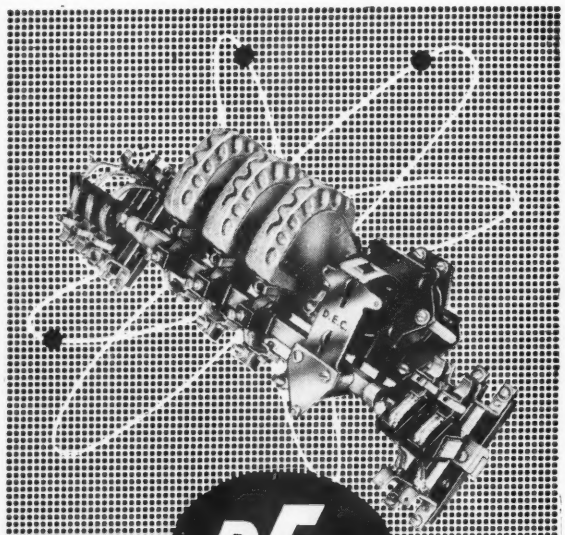
'Safetrip' Type EL15 Switch Socket

Suitable for 13/15 amp. 250v. circuit; complete earth leakage protection for domestic apparatus using up to 3 kw. Available also as switch only.

Pamphlet No. ST.2 gives details of Siemens Ediswan Monitored Earth Leakage Circuit Breaker Units for automatic switching off should the earth wires become disconnected or fractured.

SIEMENS EDISON SWAN LTD.
An A.E.I. Company
Distribution Equipment Division
38-39 Upper Thames Street, London EC4
Telephone : Central 2332
Telegrams : Sieswan Cent London

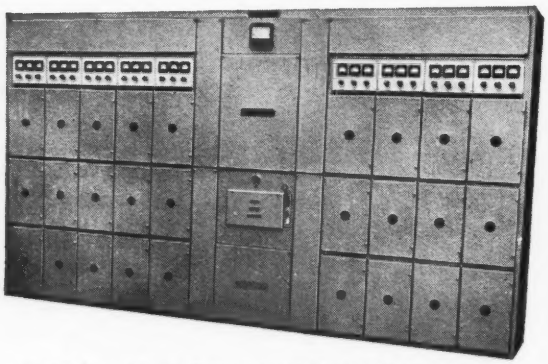
11175



DEC

THE
ULTIMATE
CONTROL

CENTRALISED MOTOR STARTING UNITS
AUTOMATIC OPERATIONAL CONTROL
COMBINED INSTRUMENTATION PANELS
CONTACTOR SWITCHGEAR TO 1600 A

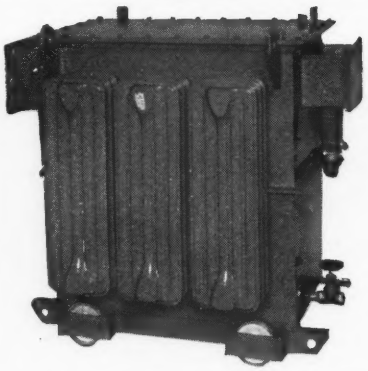


A section of the large centralised Motor Starting Plant controlling 7,000 B.H.P. specially manufactured for Messrs. Brown & Polson Ltd., Trafford Park, Manchester.
Specifically designed Switching Contactor Control and Recording Panels, incorporating all services, made to suit your individual conditions and requirements.
Our experienced Technical Sales Department is available to discuss your enquiries.

DANE ELECTRICAL
CONTROLS LIMITED
DENTON, MANCHESTER

CW 4389

It's a **STURDY** *transformer ...*



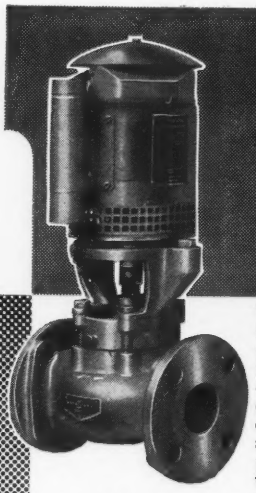
OVER
25 YEARS'
MANUFACTURING
EXPERIENCE

... in more ways than one

As supplied to Govt. Depts., National Coal Board, C.E.A. and many other large industrial undertakings.
From 500 VA to 100 kVA with special emphasis on the range 5 kVA to 100 kVA.

Sturdy ELECTRIC CO. LTD.

STURDY WORKS, HAMSTERLEY COLLIERY, NEWCASTLE-ON-TYNE
Phone: EBCHESTER 271



Cut central-heating costs and reduce heat wastage....

The Beresford booster pump will save your money and improve your central heating system —it will be easier to regulate, quicker to respond and more economical. Three models are available—for 1", 1½" and 2" pipework, the last two having flanged outlets. The motors are rubber-mounted and a rubber connection is fitted between pump and motor. May we send you details? Please ask for list PF.150.

1" model £33. 0. 0.
1½" model £36. 0. 0.
2" model £40. 0. 0.

BN.219

BERESFORD
central – heating
booster **PUMP**

CORNERCROFT GROUP

James Beresford & Son Ltd.
Kitts Green, Birmingham 33.
Telephone: STEchford 3081
and at London, Glasgow, Manchester and Leeds, etc.

a.c./d.c. conversion

with Germanium Power Rectifiers

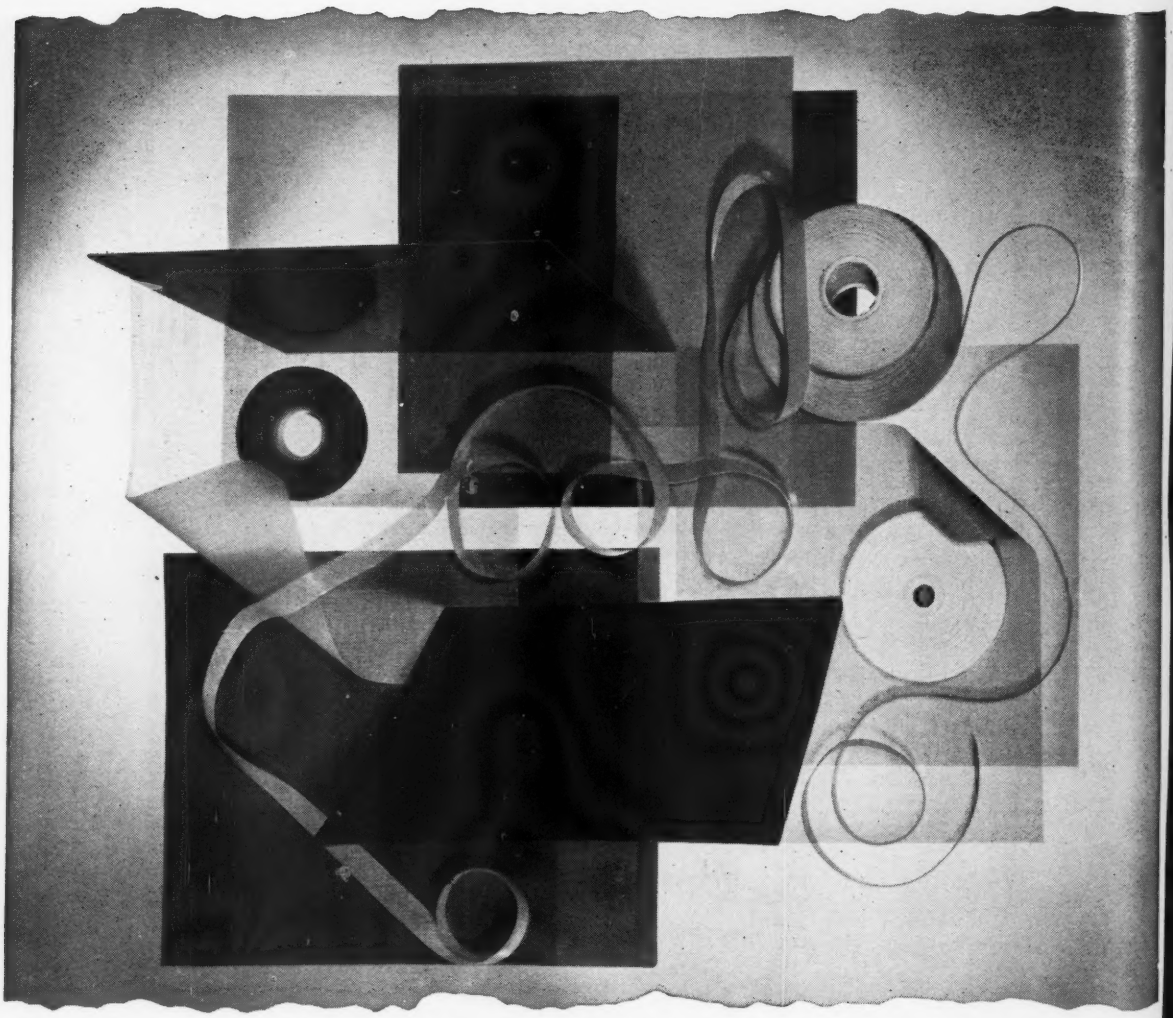
For all industrial d.c. power supplies, we offer the benefit of thirty years experience as Metal Rectifier Manufacturers.

Following copper oxide and selenium rectifiers, germanium rectifier equipments can now be provided for outputs above 25 kW where the superior efficiency and reduced bulk offers advantages.

We shall be pleased to supply details of germanium rectifier equipments.

Westinghouse Brake & Signal Co. Ltd.

(Dept. E.R. 24)
82 York Way, King's Cross, London, N.1.
Tel. TERminus 6432



Sistoflex, Elephantide, Presspahn, Leatheroid, Fibre, Bakelite, Cotton and Varnished Tapes, Insulating Paper, Adhesive Tapes, Varnished Silks and Cambrics

All the best *

INSULATING MATERIALS

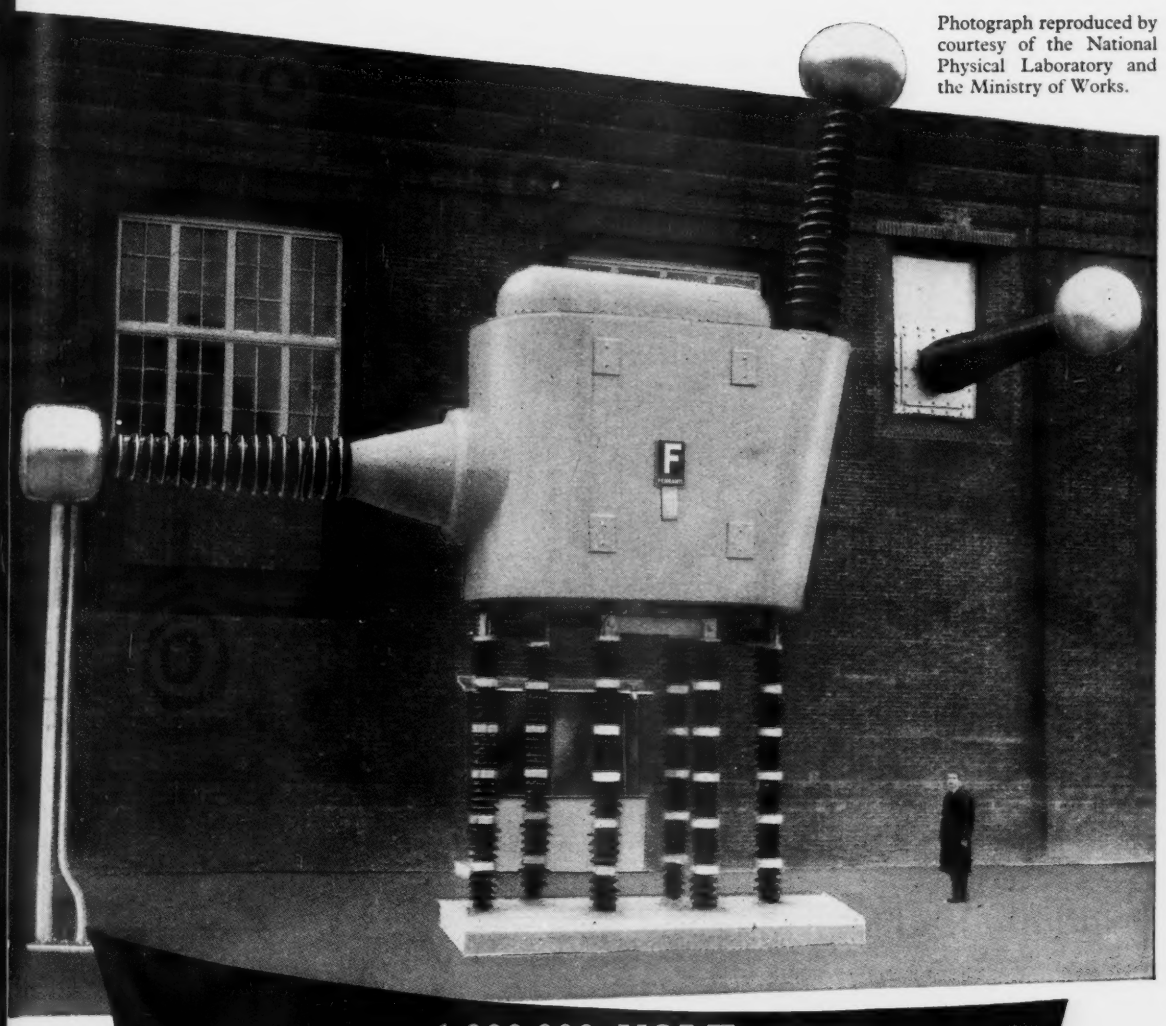
meet at

SPICERS

* 'Best' — *not necessarily the most expensive but, always, unquestionably the best of their respective kinds for insulating purposes. Remember, too, that Spicers range of papers, boards and packaging materials is the most extensive in Great Britain and is backed by full, efficient service from any of the Spicers branches in all parts of the country.*

SPICERS LTD • 19 NEW BRIDGE STREET • LONDON EC4 • BRANCHES THROUGHOUT BRITAIN • ASSOCIATED & SUBSIDIARY COMPANIES ALL OVER THE WORLD

TBW/EI



Photograph reproduced by courtesy of the National Physical Laboratory and the Ministry of Works.

1,000,000 VOLT FERRANTI TESTING TRANSFORMER *installed at the* NATIONAL PHYSICAL LABORATORY

THE HIGHEST VOLTAGE OUTDOOR TESTING TRANSFORMER IN THE UNITED KINGDOM

A 1,000,000 Volt Ferranti Testing Transformer operating with the tank at a potential of 500,000 Volts above earth. The transformer is mounted on 6 columns of insulators at a height of 12 feet from ground level. The overall height of the complete equipment is 36 feet. Associated with the equipment is a 1,000,000 Volt wall bushing, 36 feet in length, through which the supply is carried to the test laboratories.

Ferranti are specialists in the manufacture of High Voltage A.C., D.C. and Impulse Testing Equipments for all kinds of research and routine testing and are backed by over 70 years' experience in the manufacture and development of electrical apparatus.

This equipment was installed under the direction of the Ministry of Works.

FERRANTI LTD • HOLLINWOOD • LANCS

London Office: KERN HOUSE • 36 KINGSWAY • W.C.2.

FT201/2

Fire alarms

manual or automatic contacts, for large or small premises- we contract for installations or supply equipment.

Write for catalogue to

ASSOCIATED FIRE ALARMS LTD.
Claremont Road, London, E.17
LARkswood 8373/4
Branches throughout Great Britain

THE LONGEST EXPERIENCE — AFA — PLUS THE MOST UP-TO-DATE EQUIPMENT

A.F.95

WHY THE TWISTED TEETH?

Because every tooth on a 'Shakeproof' washer acts as a strut, preventing the screw or nut backing off. Every tapered, twisted tooth creates powerful spring tension between work surfaces, tension that ensures the lock is secure, tight. The sharp edges of each tooth anchor firmly, without milling. The greater the vibration — the stronger the lock. You can't find a more powerful lock than 'Shakeproof' Lock Washers, available in a wide range of sizes and types.

'Shakeproof' lock washers are available in temper.d & hardened high carbon spring steel, or phosphor bronze.

A.I.D. APPROVED

"SHAKEPROOF"

REG. TRADE MARK Nos. B611535

LOCK WASHERS AND LOCKING TERMINALS

British Patents Nos. 406556 — 518146

BARBER & COLMAN LTD
BROOKLANDS · SALE · CHESHIRE

TELEPHONE: SALE 2277 (4 lines)
TELEGRAMS: "BARCOL" SALE

"SHAKEPROOF" PRODUCTS

Dealers and Factors enquiries to the following appointed "SHAKEPROOF" stockists:

George Boyd & Co. Ltd., 229 Buchanan Street, Glasgow, C.1.
Brown Bros. Ltd. (all Branches)
Wm. Galloway & Co. Ltd., Blaydon-on-Tyne.
F. Miller & Co. (London) Ltd., Rectory Road, Acton, London, W.3.
Nettlefold & Moser Ltd. (all Branches).
Nobby Distributors Ltd., 438 Harrow Road, London, W.9.
Wordrew Ltd., 173 Princess Street, Manchester 1.

SB4

A NEW DESIGN

providing greater safety to operating personnel is described in this publication

Have you received your copy?

If not, write for Publication FG/133 to:
The ENGLISH ELECTRIC Company Limited,
Fusegear Division,
East Lancashire Road, Liverpool 10.

Stocks of 30, 60 and 100 amp. sizes are now available.

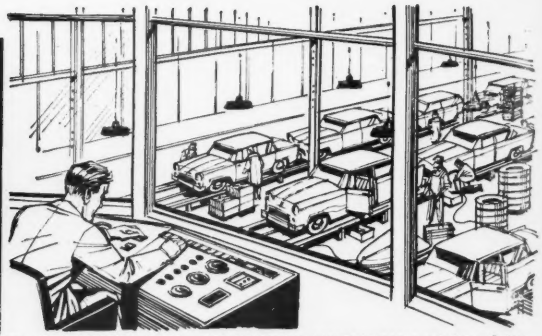
'ENGLISH ELECTRIC'

fusegear

THE ENGLISH ELECTRIC COMPANY LIMITED, MARCONI HOUSE, STRAND, LONDON, W.C.2

FG. 28A F7 WORKS: STAFFORD · PRESTON · RUGBY · BRADFORD · LIVERPOOL · ACCRINGTON

PROTECTION for PRODUCTION



Smooth running of a production line depends to a large degree on the maintenance of factory plant, which in turn relies upon an adequate supply of power.

The first indication of an interruption of this vital service will probably come through a cartridge fuse-link. It is therefore of the utmost importance that such a small, but most important, component be of a modern dependable type.

We recommend the replacement of old-fashioned rewirable fuses and the general renewal of ALL cartridge fuse-links where necessary with those of 'Ferguson Pailin' manufacture—they will never let you down, for they are produced to the highest standard of workmanship.

TABLE OF ASTA CERTIFICATE NUMBERS

Type	Current Rating A	A.S.T.A. Certificate Nos.	
		440AC4	440AC5
Q4A10	10	3195	3194
Q4A30	30	3199	3198
Q4A60	60	3204	3202
Q5B100	100	3157	3158
Q6B200	200	3159	3160
Q7B300	300	3161	3162
Q8F400	400	3460	3461
Q9F500	500	3462	3463

Ferguson Pailin LIMITED *for Switchgear*

An A.E.I. Company

Head Office & Works: **HR. OPENSHAW MANCHESTER 11,** *Telephone :* DROylsden 1301 (Pte.Branch Ex)

LONDON OFFICE : Bush House, Aldwych, W.C.2 BIRMINGHAM OFFICE : Windsor House, 656 Chester Road, Erdington, 23 GLASGOW OFFICE : Central Chambers, 109 Hope Street, C.2

REPRESENTED IN PRINCIPAL OVERSEAS TERRITORIES

FULLER
Our Transformer shop has cranage for a direct lift of 220 tons and can handle transformers of the largest outputs and voltages envisaged for use anywhere in the World.

FULLER ELECTRIC LTD

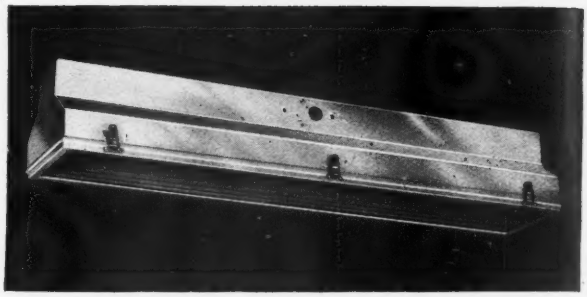
FULBOURNE ROAD, LONDON, E.17.
Phone: LARkswood 2350 (10 Lines)
Also at Birmingham: Glasgow: Manchester.

First Choice

Model EP.802
TWIN 80 WATT
Suspended or Ceiling Fitting with Opal Fluted "Perspex" Diffusing Cover

Britain's best range of Fluorescent Fittings selected for efficient lighting by famous concerns all over the world.

Model VP.802
TWIN 80 WATT
Industrial Vapour-proof Totally Enclosed Fitting suitable for internal or external application.



UTILAIR

Fluorescent Lighting Fittings and Accessories

UTILITIES (LONDON) LTD.
435-437 BRIXTON ROAD, LONDON, S.W.9
Phone: Brixton 6811/2/3

BUCK & HICKMAN LTD
ARE LARGE STOCKISTS OF
B T-H
ELECTRIC MOTORS
24 hour delivery service

COMPREHENSIVE STOCKS INCLUDE

¼—5 H.P. SINGLE PHASE—SPLIT PHASE CAPACITOR — REPULSION

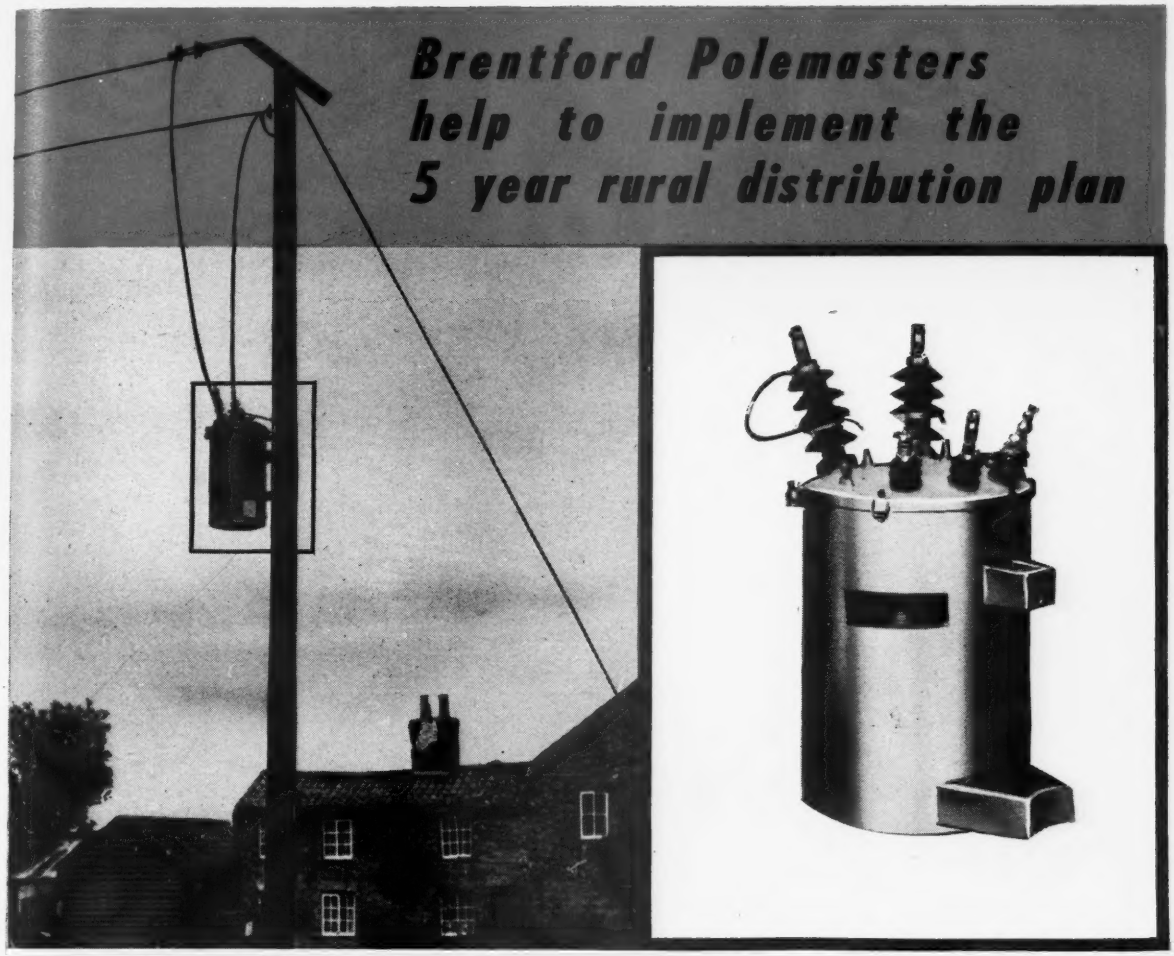
¼—25 H.P. THREE PHASE · SCREEN PROTECTED & TOTALLY ENCLOSED

⅛—1 H.P. DIRECT CURRENT 110-200-250 VOLT

Please quote reference DC/ER

HEAD OFFICE: 26 WHITECHAPEL ROAD · LONDON · E.1
BRANCHES: ALPERTON · BIRMINGHAM · GLASGOW · LEEDS · MANCHESTER · WATFORD

Brentford Polemasters help to implement the 5 year rural distribution plan



Photograph by kind permission of Eastern Electricity Board

The Brentford Polemaster provides the full benefit of low capital cost achieved through standardisation and quantity production and is designed and produced for economical electrification of outlying areas.

Based on a close study of universal requirements, the Polemaster range of Single Phase Distribution Transformers has been developed to meet a composite specification. New developments in core design equip this range with higher efficiency and lower losses than other types of equipment. Buying the Polemaster Standard Range means buying robust, long-life equipment for rural distribution, at lowest cost. The standard range comprises equipment in the following sizes . . . 5 kVA; 15 kVA; 25 kVA. Apply for quotations.

Australia. H. Rowe & Co. (Pty) Ltd., 15 Elizabeth Street, Melbourne, C.1

Belgium and Luxemburg. M. Dorfman, 5 Avenue des Phalenes, Brussels

Canada. Northern Electric Co. Ltd., P.O. Box 6123, Montreal, Que.

Chile. Kenrick Agencies Ltd., Casilla 127, Santiago de Chile

India. Kaycee & Co. Ltd., Kamani Chambers, Ballard Estate, Bombay

New Zealand. Modern Equipment Ltd., P.O. Box 468, Christchurch, N.Z.

Rhodesia and Central African Federation. W. L. Kerr (Pvt) Ltd., P.O. Box 834, Salisbury, S. Rhodesia

Pakistan. Philips Electrical Co. of Pakistan Ltd., P.O. Box 7101, Karachi 3

South Africa. G. H. Langler & Co. Ltd., P.O. Box 3762, Johannesburg

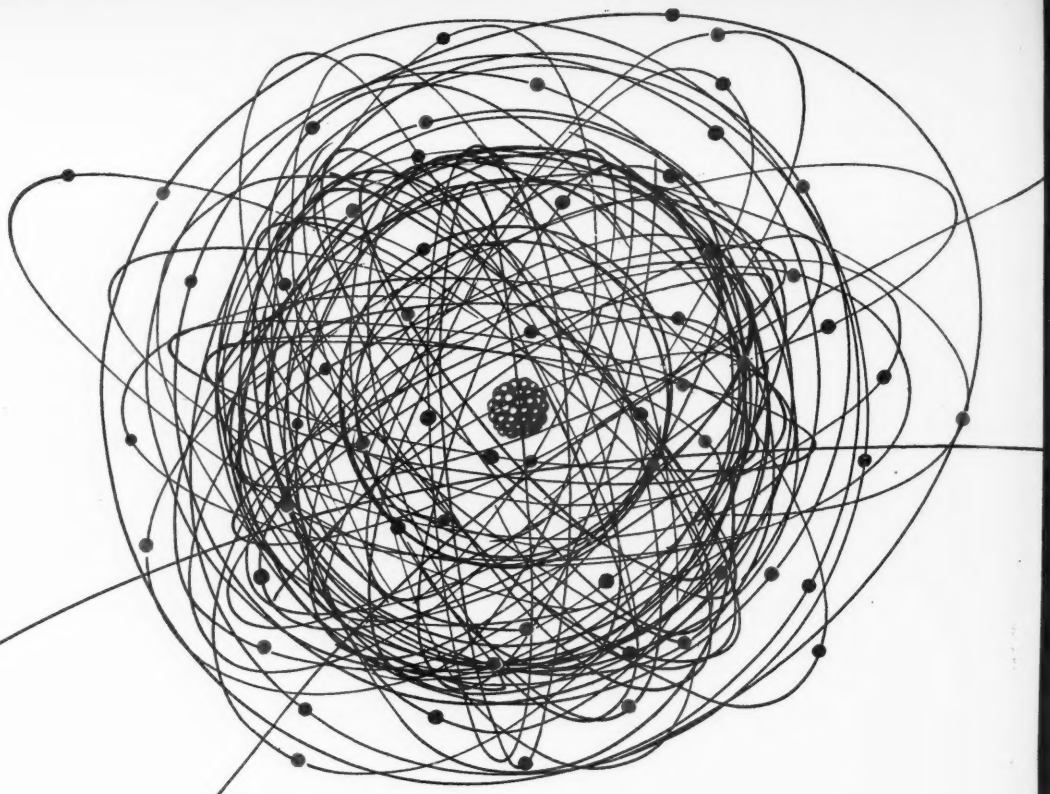
Turkey. Kanu Kollektif Sirketi, Galata, Sair Ziya Pasa Cad, 70 Zekai Hani kat 1, Istanbul

Hong Kong and China. Harvey Main & Co. Ltd., P.O. Box 268, Hong Kong

BRENTFORD POLEMASTERS

cut cost of rural transmission

BRENTFORD TRANSFORMERS LIMITED • MANOR ROYAL • CRAWLEY • SUSSEX. TEL.: CRAWLEY 25121



today's cables for tomorrow's

HENLEY'S CONTRIBUTION TO THE NEW ATOMIC POWER STATION AT CHAPEL CROSS

Nothing is more vital to Britain's future economy than the development of the peaceful atom . . . greater source of controllable power than man has ever before known.
Henley's are proud to be associated with the phase of this progress now being planned for Chapel Cross, Dumfriesshire.
Their contribution will be cables, the arteries along which will course the power that is Britain's life blood . . .
and the small but vital cabling for the plant's control and auxiliary circuits. Over 125 miles* in all, representing a £½ million contract.

* *65,000 yards of* H.T. *and* L.T. *Paper Insulated* F.I.N.D. *type cables;*
131,500 yards of V.R. *cables;*
27,000 yards of Mineral Insulated Cables.
The contract is scheduled for completion by September, 1959.

LET HENLEY CABLES

BY APPOINTMENT TO HER MAJESTY THE QUEEN ELECTRIC CABLE MANUFACTURERS

W. T. HENLEY'S TELEGRAPH WORKS COMPANY LIMITED, 51/53 Hatton Garden, London, E.C.1

power

The shape of Britain's future. How Chapel Cross Atomic Power Station will look on completion.

We are indebted to Mitchell Construction Company, Peterborough, for permission to reproduce this photograph of part of the model of the project.

CARRY THE CURRENT

CONSULTANTS: MERZ & McLELLAN, 32 VICTORIA STREET, LONDON, S.W.1

P.J. paints *speed* factory maintenance–

The essential painting of factory plant and buildings presents special problems. Heavily soiled surfaces, corrosive atmospheric conditions, difficulty of access and shortage of time are typical.

Part of Pinchin Johnson's service to industry is the provision of paints ***designed to speed and simplify*** this work, backed by a technical advisory department that will gladly offer suggestions or complete specifications on request.

A finish of almost universal application and, therefore, widely used in factory painting, is FIGARO 2-star Durable Hard Gloss Paint. Full information and colour range are assembled in this booklet for the use of factory managers and maintenance engineers.

Write for Booklet F.4 to your nearest P.J. branch.

Pinchin Johnson

4 CARLTON GARDENS, LONDON, S.W.1 *Telephone: TRAfalgar 5600*

Local Branches and Stock Depots:

BELFAST:
Dalton Buildings, Dalton Street.
Belfast 58643

BIRMINGHAM, 1:
King Edward's Place, Broad Street.
Midland 1042-3-4

BOOTLE, 20:
72 Brewster Street. *Liverpool, Bootle 2121*

BRIGHTON, 1:
26-27 Elder Place. *Brighton 23739*

BRISTOL, 8:
21 High Street, Clifton. *Bristol 33889*

GLASGOW, C.2:
Ocean Chambers, 190 West George Street. *Douglas 3281-2*

LEEDS, 11:
123 Water Lane. *Leeds 24377*

MANCHESTER, 3:
22 Bridge Street. *Blackfriars 3800*

NEWCASTLE-ON-TYNE, 1:
Pudding Chare. *Newcastle-on-Tyne 21919*

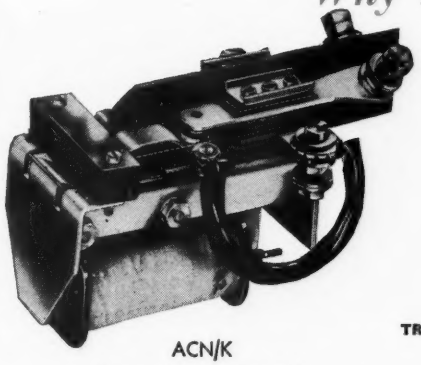
SOUTHAMPTON:
41 Lower Canal Walk.
Southampton 23648

INSTANTA

RELAYS

MODELS from our NEW RANGE

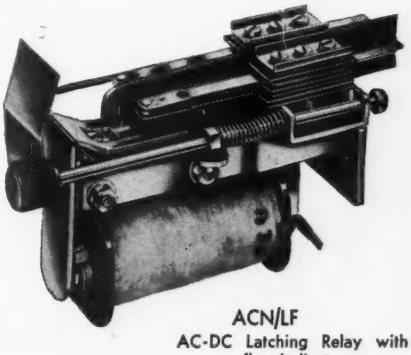
The others will interest you.
Why not get in touch?



ACN/K
Heavy duty AC-DC Relay
(switching up to 30 amps)

TROPICAL FINISH WHEN REQUIRED

Details of other types are available on request



ACN/LF
AC-DC Latching Relay with flag indicator
(switching up to 10 amps)

MAGNETIC CONTROLS LTD.

24 RITHERDON ROAD, LONDON, S.W.17

Tel.: BALham 0399

AND AT INSTANTA WORKS, UPPER STONE STREET, MAIDSTONE. Tel.: Maidstone 51485

They gave us a problem...

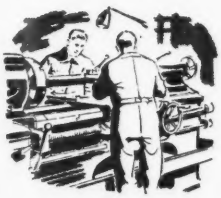
High-speed Tandem heavy current generator 30/12 K.W 3,000 r.p.m

CONSULTATION

On test bed in 21 days

We were asked by a Government Department to produce a new type of 6 K.W. direct current Generator to meet urgent priority requirements. Along with high quality performance, speed was the essence of the contract.

With streamlined co-ordination between our Design and Development Staff, the prototype generator was built and running on the test bed in 21 days.



PRODUCTION

GENERATORS

Our range of direct current machines extends from 1 to 200 K.W. These have many industrial applications, such as machine tool drives, Ward-Leonard variable speed units and in connection with automatic control systems.

VERNONS INDUSTRIES LIMITED

KIRKBY TRADING ESTATE, KIRKBY, LIVERPOOL · Tel. SIMonswood 3261

We welcome enquiries for any type of special-purpose rotating electrical equipment.

make a note of it!...

JEARY for GEARED MOTORS

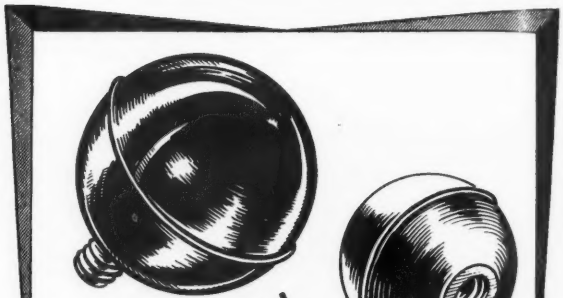
Specialists in Geared Motors and Fractional H.P. Motors

- CRABTREE MOTOR CONTROLLERS
- M.E.M. SWITCHGEAR AND STARTERS
- FANS — PROPELLER AND AXIAL FLOW INCLUDING FLAME-PROOF

JEARY
ELECTRICAL COMPANY LTD.

Successors to: G. Braulik (Est. 1887)

Main Stores: 132/142 EAST ROAD, LONDON, N.1. *Telephone: CLErkenwell 4141*



SPHERICAL KNOBS

A wide range of sizes with male or female threads for the Electrical and Engineering Industries

Full range of colours

Litholite Plastic Moulders since 1901

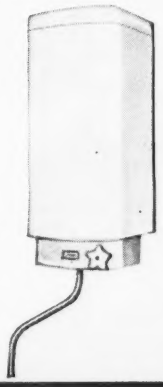
LITHOLITE Insulators & St. Albans MOULDINGS LTD.
Sandown Road, WATFORD, Herts. Tel. WATFORD 4494

POWER TRANSFORMERS

50VA-5KVA
Single or Three Phase

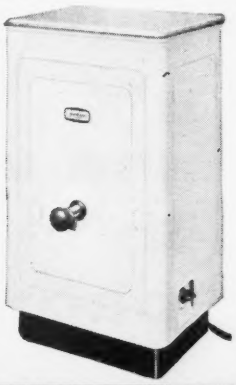
JOHN DRUMMOND (Engineers) LTD.
MARYHILL • GLASGOW N.W

Cook, wash and warm with Jackson



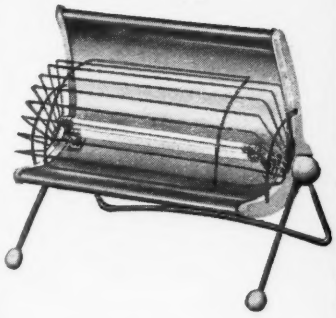
The Jackson Jill Waterheater —the latest Jackson line— 3 gallon model £16.3.0. and 1½ gallon model £15.1.0. *incl. P.T.*

The Jackson Washboiler— demand is great—a proven winner. Model 908 £12.2.0. Model 909 £13.17.0.

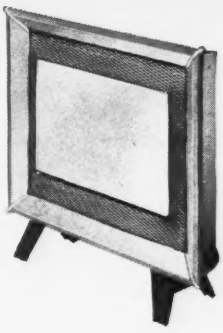


Jackson have increased their range of Electric Fires. Available in "House and Garden" colours. Ask to see the complete range.

The "Masterpiece" Convector in a variety of colours—a really efficient convector in the most attractive design. 1 and 2 kW. models from £12.4.7. *incl. P.T.*



Cookers 392/4—in colours with glass door from £34.12.6.
192/4—known the world over from £40.10.0.
69J—The "Giant" capacity table cooker, with radiant plate £19.10.0.
All Jackson cookers fitted with the wonderful new Speedring plate as standard.



NOTE: Most Jackson products can be colour matched in the kitchen, in a Turquoise Blue, or Eau-de-Nil Green, apart from All-Cream or All-White.

For satisfaction— sell them **Jackson**

THE JACKSON ELECTRIC STOVE COMPANY LIMITED, LUTON AND LONDON

Branches: Belfast, Birmingham, Cardiff, Glasgow, Leeds, Liverpool, Newcastle-on-Tyne

Mr. Dealer says:—

Vactric

REGD.

the washing machine that sells itself!... because—

only Vactric has all the answers!

Women buy them and women use them because they know that it pays to use the best and today the saving of time, fatigue and money means so much. The fact that there are no extras, heaters, table tops, etc., all being included in the basic cost helps to make Vactric the quickest selling washing machine of the year.

- **Takes up only 20″ x 22″ floor space**
- **Glass fibre tub, complete with tub cover, takes 8/9 lb. wash, retains heat longer**
- **New 8 position 12″ power wringer FOLDS AWAY — no heavy lifting**
- **The new design agitator washes quickly but gently — can't harm clothes**
- **Power pump empties 10 gallons in 2½ minutes**
- **All gears are sealed, need no attention**
- **Cleanline cabinet, all controls are recessed**
- **Four special castors for easy movement**

All these points make for efficiency, saving and good washing. The streamline finish — cream or white — completes a formidable list of selling points.

Retail price including Purchase Tax

75 gns

EASY TERMS AVAILABLE

and there's a **TWO YEAR** *Guarantee* with every machine

it's good!—it's new! —it's profitable!

Only Vactric give such a generous trade discount, the best there is! With many unique sales features, and giving such excellent profit and, of course, the fact that it's always easier to sell something that is so up-to-date that it creates interest. The Vactric *all* electric washing machine really is the answer to the busy woman's laundry problems, which means that half one's selling job is done by the quality of the machine.

Make a display with these sales aids — Free to you!

- **8′ Window Streamer**
- **Clip-on showcard**
- **Attractive full colour Brochures.**

BIG profits... when you sell— **EASY sales...**

THE Vactric REGD. ELECTRIC WASHER

* Send for the Salesman's manual and other literature, display material, etc. —FREE—from THE SALES MANAGER:- VACTRIC LIMITED, 196 SLOANE STREET. LONDON, S.W.I.

A1967

Fabricantes de motores de c.a. y c.c. a prueba de llamas, y a prueba de goteos. Motores de repulsión-inducción y de capacitor. Motores de 0,5 y 0,75 h.p. para bombas de gasolina. Motores para ventiladores contra-rotativos.

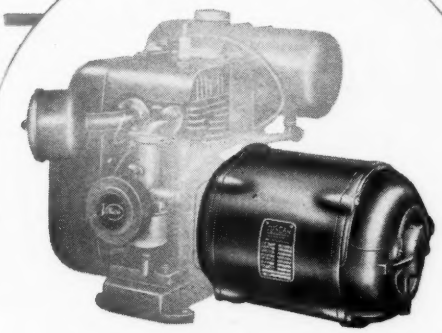
TUSCAN

MANUFACTURERS OF FLAME-PROOF & DRIP-PROOF MOTORS A.C. & D.C.

REPULSION, INDUCTION & CAPACITOR MOTORS

PETROL PUMP ½-¾ H.P. MOTORS

CONTRA-ROTATING FAN MOTORS



500 Watt Close Coupled Battery Charging Generator

ALTERNATORS & D.C. GENERATORS

CLOSE COUPLED TYPE FOR ALL MAKES OF ENGINES OR FOOT MOUNTED 0.25-3 kVA

Alternadores y generadores de c.c. De tipo de acoplamiento compacto para todas las marcas de motores o de montaje sobre pies. De 0,25 a 3 kVA.

LET TUSCAN PROVIDE THE POWER

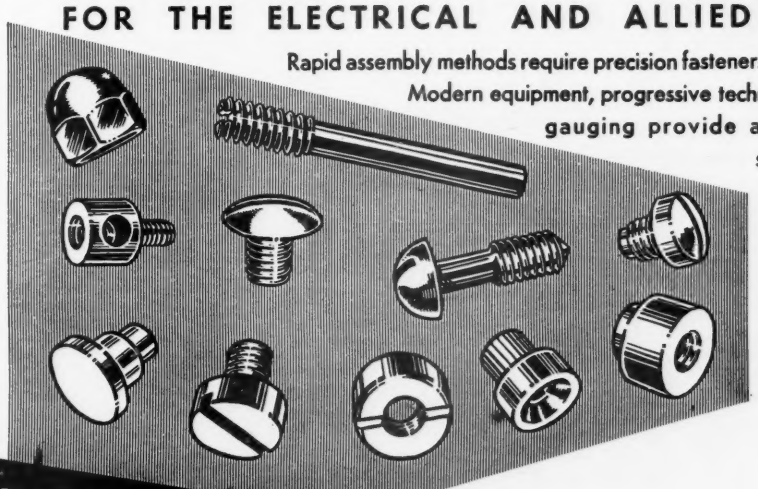
TUSCAN ENGINEERING COMPANY LIMITED
BRIDGEND, GLAMORGAN, GT. BRITAIN

Precision **TURNED FASTENERS**
FOR THE ELECTRICAL AND ALLIED TRADES

ALL AUTOMATIC AND CAPSTAN TURNED PRODUCTS

STOCKS of standard turned screws available for immediate use

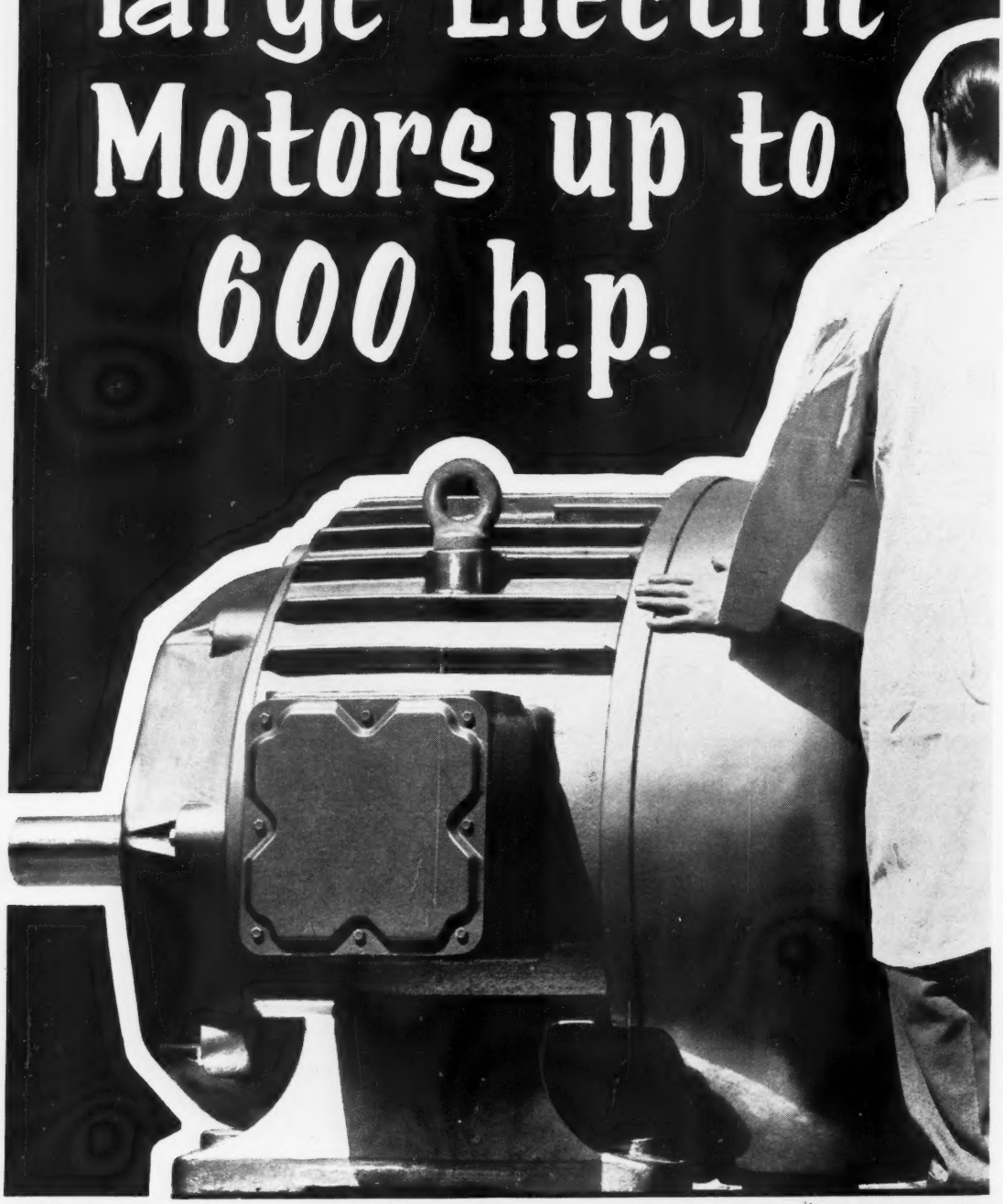
Rapid assembly methods require precision fasteners and components. Modern equipment, progressive technique, and quality gauging provide an unsurpassed specialist service.



VERNIER

MANUFACTURING CO. LTD.
Garman Road, London, N.17
Telephone: Tottenham 5077

BROOK for large Electric Motors up to 600 h.p.



BROOK MOTORS LTD · HUDDERSFIELD

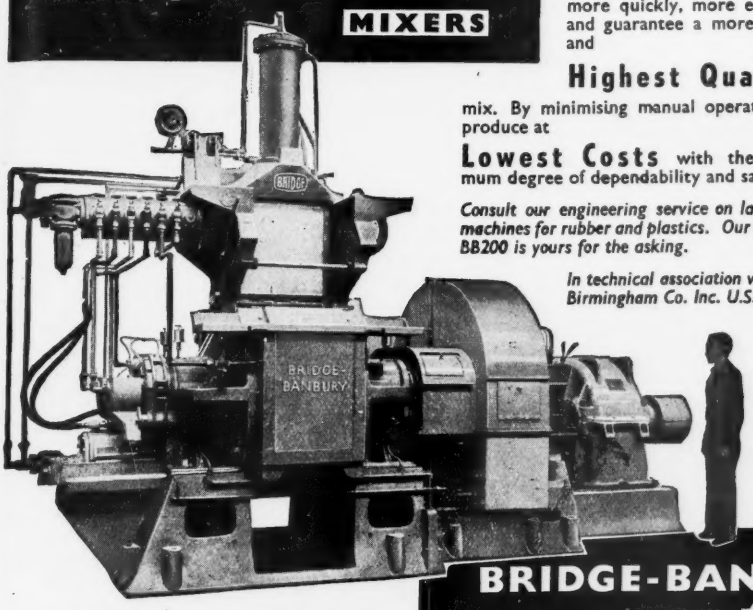
57/10

Bridge-Banbury MIXERS

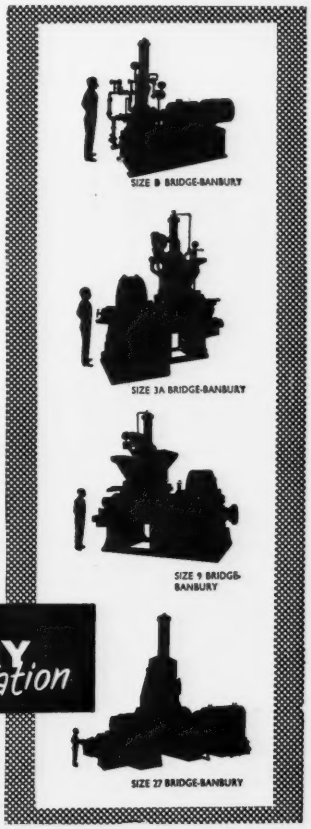
Produce the **Highest Output** more quickly, more efficiently, and guarantee a more uniform and **Highest Quality** mix. By minimising manual operating they produce at **Lowest Costs** with the maximum degree of dependability and safety.

Consult our engineering service on layouts and machines for rubber and plastics. Our catalogue BB200 is yours for the asking.

In technical association with Farrel-Birmingham Co. Inc. U.S.A.



SIZE 11 BRIDGE-BANBURY



SIZE 0 BRIDGE-BANBURY

SIZE 3A BRIDGE-BANBURY

SIZE 9 BRIDGE-BANBURY

SIZE 27 BRIDGE-BANBURY

BRIDGE-BANBURY *Automation*

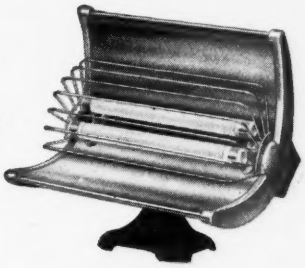
DAVID BRIDGE & CO. LTD., CASTLETON, ROCHDALE, LANCS

Phone: CASTLETON (ROCHDALE) 57216 Grams: Coupling Phone Castleton Lancs

LONDON OFFICE: BROUGHTON HOUSE, 6-7-8 SACKVILLE STREET, PICCADILLY, W.1

Phone: REGENT 7480 Grams and Cables: "EDERACEO" Piccy London

THE POPULAR
FOUR-TEN MODEL
REFLECTOR FIRE
WITH THE LONG-LIFE ELEMENT



AVAILABLE IN 1-BAR and 2-BAR SIZES

Please write for catalogue and prices

ELECTROWAY HEATERS LTD

LOUGHBOROUGH, LEICS. *Telephone:* 4381 (2 *lines*)

If you need

a small **METAL PRESSING** for your product, why not consult us?

We specialise in light precision presswork in all metals for the Electrical Trades.

QUOTATIONS BY RETURN

BIRMINGHAM SPECIALITIES LTD.

80-81 Bath Street, Birmingham 4. *Phone: CENTRAL 2492*

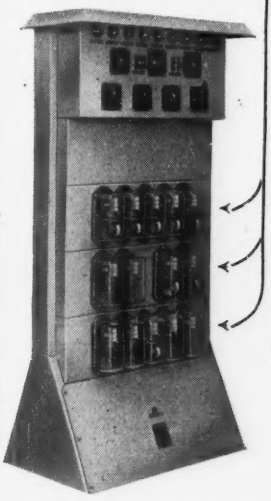
JM

JOHN MORRIS

ELECTRICAL ENGINEERING CO. LTD.

BILSTON TEL. 41237-8 STAFFS

CONTROL RELAYS

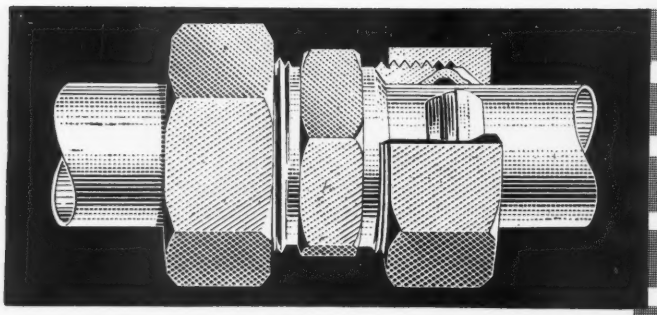


Type CR

Available as:—
AC/DC Direct Acting or Time Delayed Models with up to five normally open and five normally closed contacts.

Ask for leaflet CR150453

FASTEST ON THE JOB!



compression joints

and the safest

Simplifix Joints save time and trouble. Beyond removing the burrs no work is required on the pipe ends. As the securing nut is tightened, the sealing ferrule is compressed on to the pipe without weakening it in any way.

Note: Simplifix fittings can be used on very thin walled tubing.

A full range of fittings, elbows, tees, crosses, etc., is available and illustrated in our catalogue which will be sent on request.

SIMPLIFIX COUPLINGS LIMITED
HARGRAVE ROAD
MAIDENHEAD
BERKS
Tel: Maidenhead 2271/4

SIMPLIFIX

RECTIFIERS

WITH METAL RECTIFICATION

For: Battery Charging, Emergency Lighting, Engine Starting, Lift Control, Telephone Systems, Signals, Communications, Laboratories, Etc.

WE SHALL BE GLAD TO QUOTE FOR EQUIPMENT MADE TO SUIT YOUR OWN PARTICULAR PURPOSE.

PROMPT DELIVERY

CAYSON

A.I.D. APPROVED

Photo shows a heavy duty Battery Charger for use on airfields.

CAYSON ELECTRICS LTD : WATFORD
London Office: ANGEL HOUSE, LONDON, N.1.
TEL: TERMINUS 0566 7 TEL: WATFORD 7156 & 7177

A NEW CONDUIT BENDER —by HILMOR

The No. 4 Three Point Bender with ratchet actuated ram, adjustable bending head and degree of bend indicator. A sturdy, light-weight machine designed to give long and trouble free service under all conditions.

BENDS: ⅜", ½", 1", 1¼" and 1½" screwing size conduit. (Also ¼" to 1" nom. bore gas and steam.)

NOTE THESE FEATURES

- Speedy and accurate bending with minimum of manual effort.
- Produces good quality bends — sets, double sets, saddle bends, etc.
- Absence of top plate obstruction permits production of bends in similar or different planes with minimum of straight between adjacent bends.
- Designed for bolting to bench, holding in vice or mounting on portable stand with detachable legs.

Send for further details to:

HILMOR LTD. (Sales & Service)
CAXTON WAY, STEVENAGE, HERTS
Phone: Stevenage 881 *Grams: Tubenders, Stevenage*

YOU should see this!

Full Details of a really low cost top quality motor...

IN Newman DATA SHEETS 101

BUILT TO THE DRAFT BS CW (EL2) 6245 WITH CLASS 'E' INSULATION

DESCRIBING...

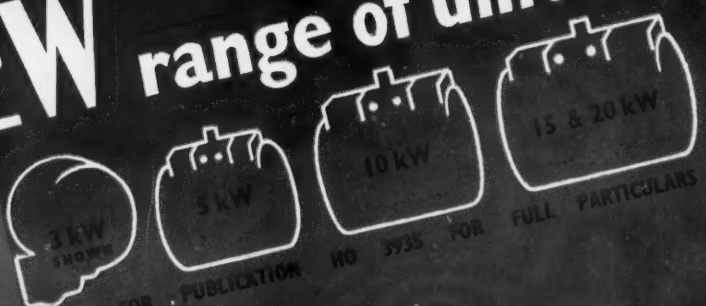
This concise, three-sheet set of data sheets gives you all the general and technical information you need to assess this new motor. Specification performance data, dimensions and a great deal of other useful information such as applications, operating temperatures and altitudes—all presented concisely and devoid of frills.

...THE NEW Newman DRIP-PROOF

is part of your job to know about motors send today
a copy of **Data Sheet HA.101** 'phone: LONDON: Sloane 8206.
CHESTER: Deansgate 2837/8. GLASGOW: Central 2101/2.
MINGHAM Midland 1143 or write to NEWMAN INDUSTRIES LIMITED · YATE · BRISTOL · Telephone: Chipping Sodbury 3311

G.E.C.

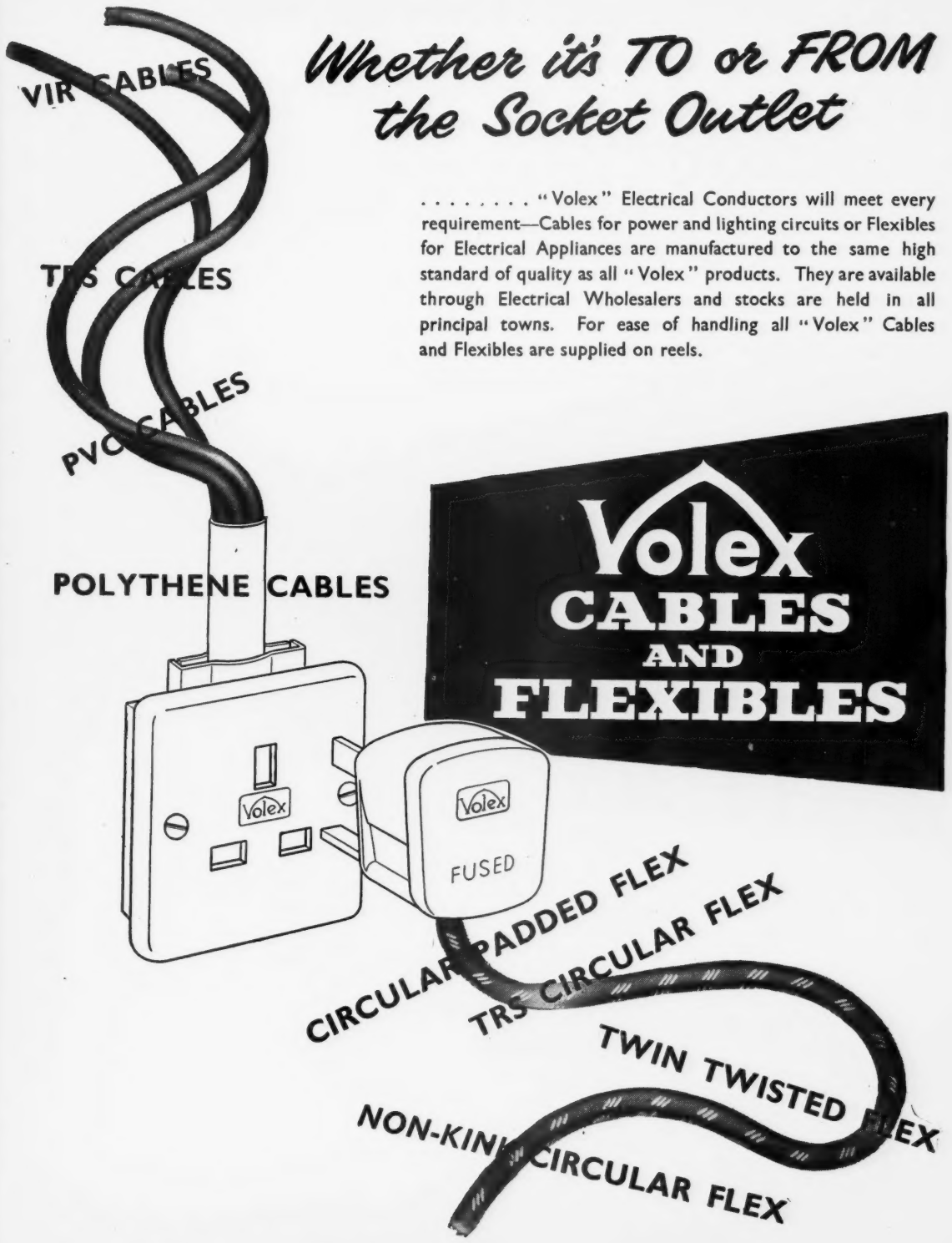
NEW range of unit heaters



WRITE FOR PUBLICATION NO 3935 FOR FULL PARTICULARS

Whether it's TO or FROM the Socket Outlet

. . . . . "Volex" Electrical Conductors will meet every requirement—Cables for power and lighting circuits or Flexibles for Electrical Appliances are manufactured to the same high standard of quality as all "Volex" products. They are available through Electrical Wholesalers and stocks are held in all principal towns. For ease of handling all "Volex" Cables and Flexibles are supplied on reels.



Volex VOLEX ELECTRICAL PRODUCTS LTD
SALFORD 6

Telephone: PENdleton 4373 Telegrams: "VOLEXPROD", Salford 6

©

THE FINEST RANGE OF SMALL HORSE POWER MOTORS FOR ANY INSTALLATION

with the one-piece gearbox...

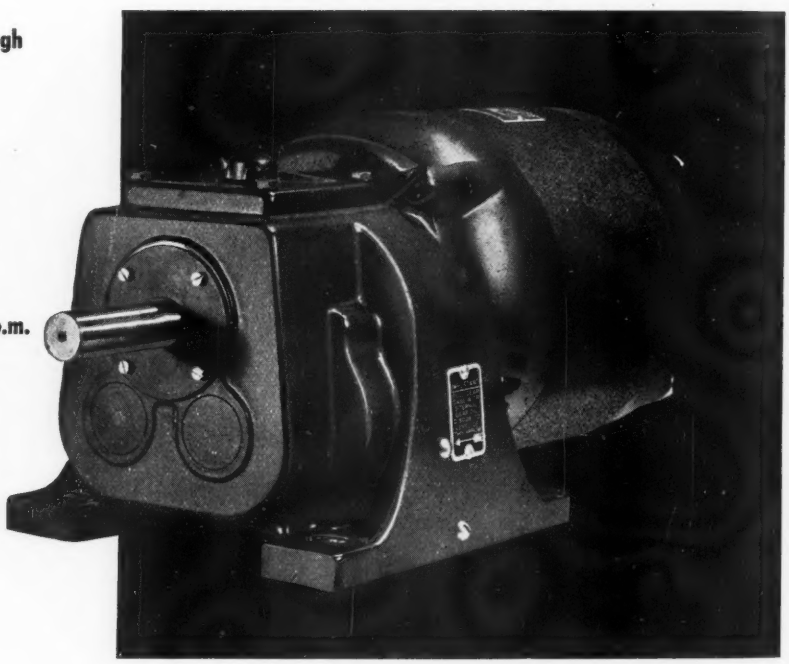
★ **strong, stiff, a box casting always properly in line**

★ **with no possible oil leaks through joints**

★ **gears transmit 200 lb. ft. at 26 r.p.m. up to 480 r.p.m.**

★ **or 100 lb. ft. between 0.66 r.p.m. and 22 r.p.m.**

★ **foot or flange mounting**



TYPE H.D. geared motors

A.C. or D.C. NECO motors of all fixed or variable speed types, made in the same factory as the gearbox, allow competitive prices and speedy delivery.

NECO TRADE MARK

NECO GEARED MOTORS LIMITED

a non-ring firm

OLD TOWN · LONDON · SW4

SUBSIDIARY OF NORMAND ELECTRICAL CO. LTD

Telephone : MACaulay 3211-4

ADVANCING *with* Aeroflex

HOPE'S PATENTS

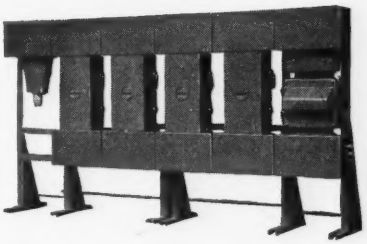
Photograph by courtesy of British Crepe Limited.

Fluvent Cubicle Type Switchboard recently supplied to British Crepe Ltd.

Fluvent Power Pillars—fully described in publication PP1, available on request.

ENERGY DISTRIBUTION FOR TODAY'S CONDITIONS

Energy Distribution for today's conditions demands fresh approaches. The examples illustrated are typical contributions by us to meet individual needs of widely different character.



Aeroflex Unit Type Switchboard, arranged so that any of the four outgoing circuits can be switched to either side of the busbars.

Parmiter Hope & Sugden Ltd

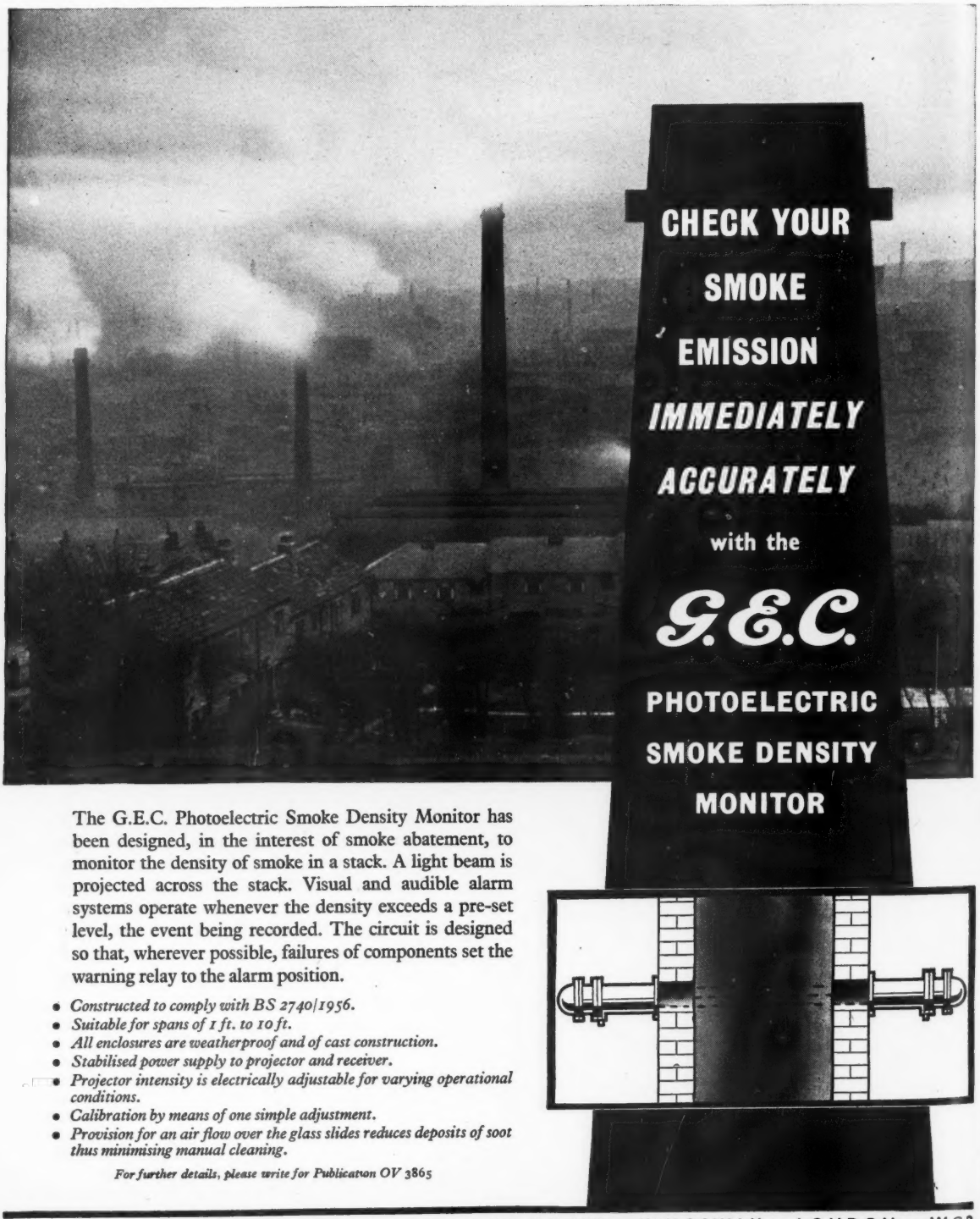
MANCHESTER 12

London: 34 Victoria Street, S.W.1. *Glasgow:* 5 Somerset Place, C.3 *Birmingham:* 39/41 Carrs Lane, 4

dm PH127

SMOKE

A MATTER OF URGENCY FOR EVERYONE



The G.E.C. Photoelectric Smoke Density Monitor has been designed, in the interest of smoke abatement, to monitor the density of smoke in a stack. A light beam is projected across the stack. Visual and audible alarm systems operate whenever the density exceeds a pre-set level, the event being recorded. The circuit is designed so that, wherever possible, failures of components set the warning relay to the alarm position.

- *Constructed to comply with BS 2740/1956.*
- *Suitable for spans of 1 ft. to 10 ft.*
- *All enclosures are weatherproof and of cast construction.*
- *Stabilised power supply to projector and receiver.*
- *Projector intensity is electrically adjustable for varying operational conditions.*
- *Calibration by means of one simple adjustment.*
- *Provision for an air flow over the glass slides reduces deposits of soot thus minimising manual cleaning.*

For further details, please write for Publicaton OV 3865

THE GENERAL ELECTRIC CO LTD · MAGNET HOUSE · KINGSWAY · LONDON · WC2

Classified Advertisements

CLASSIFIED advertisements are PREPAID at 3/6 per line (approx. 6 words) per insertion. Where an advertisement includes a Box Number there is an additional charge of 1/-.

DISPLAYED CLASSIFIED:—48/- per inch. Cheques and Postal Orders should be crossed and made payable to ELECTRICAL REVIEW PUBLICATIONS LTD.

SERIES DISCOUNTS for consecutive insertions:—13, 5%; 26, 10%; 52, 15%.

SITUATIONS WANTED:—Three insertions under this heading can be obtained for the price of two if ordered and prepaid with the first insertion.

REPLIES to Box Numbers should be addressed to the Box Number in the advertisement, c/o ELECTRICAL REVIEW, Dorset House, Stamford Street, London, S.E.1, but if not to be delivered to any particular firm or individual they should be accompanied by instructions to this effect, addressed to the Manager of the ELECTRICAL REVIEW. Replies in such cases cannot be returned. The name of an advertiser using a Box Number will not be disclosed.

ADVERTISEMENTS are accepted up to First Post on Monday of the week of issue and should be addresssed to ELECTRICAL REVIEW, Classified Advertisement Department, Dorset House, Stamford Street, London, S.E.1.

Original testimonials should not be sent with applications for employment

OFFICIAL NOTICES, TENDERS, ETC.

CITY OF HEREFORD

Tenders for Street Lighting, Trunk Road A.49

TENDERS are invited for the provision, erection and putting into service of Street Lighting Columns and Lanterns on Trunk Road A.49 in the city.

The scheme allows for approximately 44 sodium discharge points.

Specifications, schedules and form of tender can be obtained from Mr. F. Margerison, A.M.I.C.E., City Surveyor, Town Hall, Hereford, on receipt of a deposit of £2 2s., which will be returned on receipt of a bona fide tender.

Plans and conditions of contract can be inspected at the same offices during normal office hours.

Tenders endorsed "Street Lighting" in the envelope provided, and bearing no name or mark to indicate the sender, must reach the undersigned not later than 9 a.m. on the 14th October, 1957.

The Council do not bind themselves to accept the lowest or any tender.

T. B. FELTHAM,
Town Clerk.

Town Hall,
Hereford. 622

MATLOCK URBAN DISTRICT COUNCIL

Street Lighting: Trunk Road A.6, from Masson Mills, Matlock Bath, to Dimple Road, Matlock

TENDERS are invited for the provision and erection of 119 Group "A" lighting units consisting of Steel Columns, Reinforced Concrete Columns, 140-watt Sodium Discharge Lamps, 3/80-watt Fluorescent Lamps and auxiliary equipment, etc., on the above road.

General conditions of contract and plans may be inspected during office hours, and specification, bills of quantities and form of tender obtained from Mr. N. Chamberlain, Engineer and Surveyor, Town Hall, Matlock, on payment of a deposit of £2 2s., which will be refunded upon receipt of a bona fide tender.

Tenders, in plain sealed envelopes, endorsed "Tender for Street Lighting," must be delivered to the undersigned not later than 12 noon on the 31st October, 1957.

The Council do not bind themselves to accept the lowest or any tender.

J. OWEN HUNT,
Clerk and Solicitor.

Town Hall,
Matlock.
14th September, 1957. 546

CITY OF WAKEFIELD

Street Lighting

TENDERS are invited for the supply and erection of 111 15-ft. Concrete columns complete with 125-watt MB/U lamps, lanterns and control gear, 3 15-ft. Concrete Columns complete with 100-watt lamps and lanterns, and 1 Wall Bracket complete with 125-watt lamp, lantern and control gear.

Tender forms and specifications may be obtained from the City Engineer, Town Hall, Wakefield.

Tenders to be returned not later than 10 a.m. Monday, 7th October, 1957.

W. S. DES FORGES,
Town Clerk.

Town Hall,
Wakefield. 623

CLASSIFIED ADVERTISEMENTS ARE PREPAID

BUSHEY URBAN DISTRICT COUNCIL

Improved Lighting Scheme, Group "B" Roads

TENDERS are invited for the erection of 259 (provisional) Reinforced Concrete Lighting Columns (15 ft. mounting height), complete with brackets, and the installation of lanterns suitable for use with tungsten filament lamps, and the necessary wiring.

Tenders are also invited for the supply of 259 (provisional) open type top entry lanterns suitable for use with 100/150-watt tungsten filament lamps.

Forms of tender, specification and bills of quantities can be obtained, on payment of a deposit of one guinea in respect of each tender, from the Engineer and Surveyor at the address given below. Cheques to be made payable to "Bushey Urban District Council," and upon receipt of a bona fide tender and the return of all documents the deposit will be refunded.

Tenders must be delivered to the undersigned not later than 12 noon on Friday, 18th October, 1957, in plain sealed envelope endorsed "Tender for Erection of Lighting Columns and Installation Work" or "Tender for Lighting Equipment," whichever is applicable.

The Council does not bind itself to accept the lowest or any tender, and the acceptance of a tender will be subject to the approval of the Ministry of Transport.

C. G. EVERATT,
Clerk of the Council.

Council Offices,
Rudolph Road,
Bushey, Herts.
13th September, 1957. 590

SITUATIONS VACANT

CENTRAL ELECTRICITY AUTHORITY

London Division

APPLICATIONS are invited for the following superannuable posts. Conditions of service in accordance with N.J.B. Agreements, Schedule A or B. Salary includes London allowance. Qualifications entitling to Graduate Membership of the I.E.E. or I.Mech.E. an advantage.

ASSISTANT ENGINEER
(Electrical Testing),
FULHAM POWER STATION
(Vacancy No. 57/859).

Knowledge of testing and routine maintenance of power station electrical equipment, including generators, switchgear, transformers, motors and protective equipment.

Salary Class K, Grade 15 = £725 p.a.

FOURTH ASSISTANT ENGINEER
(Meter Section),
TECHNICAL DEPT., D.H.Q.
(Vacancy No. 57/860).

Experienced in calibration and maintenance of polyphase meters, relays, instruments and testing of instrument transformers. Knowledge of electronic equipment all types an advantage.

Salary Class AX/EX, Grade 6 = £750/£985 per annum.

GENERAL ASSISTANT ENGINEERS,
TECHNICAL DEPT., D.H.Q.
(Vacancy No. 57/861).

Candidates should possess good technical qualifications. Some training or experience in polyphase metering, telecommunications, electronics or system protective gear an advantage.

Salary Class AX/EX, Grade 7 = £590/£745 per annum.

Applications, quoting vacancy number, to (or on form from) Central Electricity Authority, London Division, P.O. Box 136, London, W.1, by 7th October, 1957. 605

SOUTH EASTERN ELECTRICITY BOARD

ASSISTANTS (Expenditure):—
One at Kingston and District.
One at Sutton District.

Salary £765-£840 per annum plus London weighting in accordance with Grade 4 of the N.J.C. Agreement. Superannuable.

Candidates should have a wide knowledge of the work of a District Chief Clerk's department, with ability to organise and control staff. They should be competent to take charge of a section comprising capital costing, rechargeable work, wages, invoices, stores and showroom stock records.

Applications, naming two referees, on forms from C. W. Hughes, B.Sc., M.I.E.E., Surrey Manager, SEEBOARD, Rough Rew, Ridgeway Road, Dorking, Surrey, by 9th October, 1957.

FIRST ASSISTANT DISTRICT ENGINEER, Weald District.

Salary £935-£995 under N.J.B. Class E, Grade 5. Superannuable.

Applicants should be suitably qualified and have had training and experience in the construction, operation and maintenance of underground and overhead systems up to 33 kV.

Applications, naming two referees, to W. J. Collins, A.M.I.E.E., District Manager, SEEBOARD, Highgate, Hawkhurst, Kent, by 9th October, 1957.

LINESMAN (Overhead Power)
(Over 30,000 volts), Mid-Sussex Area
(to be based in Brighton).

Wages 4s. 7½d. per hour for a 44-hour 5-day week under N.J.I.C. Agreement.

Applicants should have had experience in the construction and maintenance of steel tower lines.

Applications, naming two referees, to Manager, SEEBOARD, Mid-Sussex Area, Mid-Sussex House, North Road, Brighton, by 9th October, 1957.

FOURTH ASSISTANT ENGINEER
(Operation and Maintenance),
Surrey Sub-Area Headquarters, Dorking.

Salary £790-£835 per annum in accordance with N.J.B. Class K, Grade 13. Superannuable.

Applicants, of at least H.N.C. standard, should have had a sound training in electrical distribution. Duties will chiefly consist of assisting in plant maintenance and the testing and commissioning of system protection. A knowledge of, or interest in, the latter would be an advantage.

Applications, naming two referees, on forms from C. W. Hughes, B.Sc., M.I.E.E., Surrey Manager, SEEBOARD, Rough Rew, Ridgeway Road, Dorking, Surrey, by 9th October, 1957.

A. L. BURNELL,
Secretary. 647

MERSEYSIDE & NORTH WALES ELECTRICITY BOARD

DEMONSTRATOR required in the North Wirral District. Salary within range of £500/£600 per annum (N.J.C. Grade I).

Candidates should have sales experience, a good knowledge of electrical appliances and be competent to give demonstrations of cooking, laundering and housecraft subjects. The possession of a recognised diploma in domestic science or other approved certificates advantageous.

Appointment subject to medical examination. Pension scheme.

Application forms obtainable from the Manager, No. 3 Sub-Area, Electricity House, Newgate Street, Chester. Closing date 7th October, 1957. 640

***Situations Vacant** (continued)*

CENTRAL ELECTRICITY AUTHORITY

East Midlands Division

APPLICATIONS are invited for the following vacancies in this Division :—

ASSISTANT SHIFT CHARGE ENGINEER, DRAKELOW POWER STATION
(Vacancy No. 162/57/ER).

Applicants should have suitable technical qualifications and experience in power station operation.

Salary will be within Class J, Grade 9 (£935-£995 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications, 9th October, 1957.

PLANT SHIFT CONTROL ENGINEER, DRAKELOW POWER STATION
(Vacancy No. 164/57/ER).

Experience desirable in control of boilers and turbines at high pressure and temperature, pulverised fuel, together with electrical control room experience.

Technical qualifications to Higher National standard desirable.

Conditions of service and salary will be within Class J, Grade 10 (£885 - £930 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications, 9th October, 1957.

FIRST ASSISTANT CHEMIST, NORTHAMPTON POWER STATION
(Vacancy No. 165/57/ER).

Previous experience in a power station laboratory is essential and candidates should hold the Higher National Certificate in Chemistry.

Candidates must be familiar with the methods of sampling and analysis of coal, water and oil and with the interpretation of the analytical results.

Conditions of service and salary will be in accordance with Class G, Grade 9 (£835-£880 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications, 9th October, 1957.

ASSISTANT SHIFT CHARGE ENGINEER LEICESTER POWER STATION
(Vacancy No. 166/57/ER).

Applicants should have had previous experience in the operation of a pulverised fuel fired station and be technically qualified.

Salary will be in accordance with N.J.B. Schedule, Class G, Grade 9 (£835-£880 per annum).

Closing date for receipt of applications, 9th October, 1957.

FIRST ASSISTANT CHEMIST, CASTLE DONINGTON POWER STATION
(Vacancy No. 167/57/ER).

Previous experience in a power station laboratory is essential and candidates should preferably be Associates of the Royal Institute of Chemistry or hold an equivalent qualification. Candidates must be familiar with the methods of sampling and analysis of coal, oil and water and with the interpretation and application of the analytical results. Experience with problems arising from high pressure, high temperature operation and of the solution to such problems is desirable.

Conditions of service and salary will be in accordance with Class L, Grade 9 (£1,065-£1,140 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications, 9th October, 1957.

ASSISTANT SHIFT CHARGE ENGINEER, BURTON-ON-TRENT POWER STATION
(Vacancy No. 168/57/ER).

Applicants should have H.N.C. or equivalent qualifications and have experience in power station operation.

Salary will be in accordance with Class E, Grade 9 (£740-£785 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications, 16th October, 1957.

ASSISTANT ENGINEER (Instruments), WILLINGTON "A" POWER STATION
(Vacancy No. 170/57/ER).

Candidates should have had a sound technical training and have a good practical knowledge of the construction, repair and testing of power station instruments and automatic controls.

Salary will be in accordance with Class K, Grade 10 (£935 - £995 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications, 16th October, 1957.

THIRD ASSISTANT ENGINEERS
(Mechanical),
GENERATION (Construction) DEPT.,
CASTLE DONINGTON POWER STATION SITE
(Vacancy No. 171/57/ER).

Applicants should have had a fundamental training in mechanical engineering, including workshops, and should preferably have had experience in the manufacture, erection, maintenance and operation of mechanical plant as installed in modern power stations. Preference will be given to candidates who possess a degree or are Graduate Members of the Institution of Mechanical Engineers.

Salary will be within Class AX/EX, Grade 4 (£895-£1,140 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications, 16th October, 1957.

These appointments will be pensionable within the provisions of the Central Electricity Authority and Area Boards (Staff) Superannuation Scheme.

Applications should be submitted on the official form AE6/ACT, which may be obtained from the Divisional Establishments Officer, Central Electricity Authority, East Midlands Division, P.O. Box 25, Barker Gate, Nottingham, and should be returned to the undersigned by the date stated. Please quote vacancy number, the date stated. PLEASE QUOTE VACANCY NUMBER.

L. F. JEFFREY,
Divisional Controller.

18th September, 1957. 607

JOSEPH LUCAS (ELECTRICAL) LTD.
Great King Street, Birmingham

AS a result of expansion of our road vehicle lighting development department to meet the growing demands of the motor industry we have vacancies for

ENGINEERS AND PHYSICISTS

of at least H.N.C. standard to work on the following projects. Experience or knowledge of photometric and electrical instruments desirable.

The design and development of vehicle lighting equipment and in particular the development of optical systems for future projects.

Development work on specific problems related to vehicle lighting equipment and the design of laboratory and factory control equipment for these products.

In addition there are vacancies for SENIOR DESIGNERS required to work in close co-operation with car designers and styling engineers on the design of lighting equipment for new car models. Experience in the design of pressed metal components for large quantity production desirable.

All of these positions carry attractive starting salaries and provide excellent prospects for advancement. Staff pension fund.

Apply in writing, stating age, qualifications and experience, to the Personnel Manager, Joseph Lucas (Electrical) Limited, Great King Street, Birmingham, 19, quoting reference PM/D/156.

127

TECHNICAL SALES ENGINEERS

J. A. CRABTREE & CO. LTD. are augmenting their Motor Control Gear Sales Staff and applications are invited from qualified men for positions in the South London/S.E. England area and in South Wales.

Apply by letter to the Sales Director, Lincoln Works, Walsall, Staffs, giving full particulars, including age, technical qualifications, experience, salary required and relevant personal details. 609

SOUTHERN ELECTRICITY BOARD

Assistant Engineer (Substation Maintenance)

BASINGSTOKE District of No. 3 (Portsmouth) Sub-Area. Salary N.J.B. Class E, Grade 7 (£835 × £15 to £880 per annum). N.J.B. conditions of service.

The duties of the post will be to assist, under the Maintenance and Operation Engineer, with the maintenance of plant and equipment at outdoor and indoor substations on both urban and rural systems. Candidates should have had a good technical training, experience of the testing and maintenance of plant and equipment, and should possess suitable technical qualifications. The appointment will involve standby duties.

Engineering Draughtsman

No. 3 (Portsmouth) Sub-Area Office, Substation Section. Salary N.J.B. Schedule D, Grade 6 (£595-£715 per annum), commencing at a point dependent upon qualifications and experience. N.J.B. conditions of service.

Applicants should be qualified draughtsmen, and the successful candidate will be required to undertake, under supervision, the preparation and final layout of diagrams and drawings relating to substation plant and equipment. Possession of suitable technical qualifications will be an advantage.

Applications for these two appointments, on forms obtainable from the Sub-Area Secretary, Lower Drayton Lane, Cosham, Portsmouth, and returned to him in envelopes suitably endorsed, not later than 7th October, 1957.

Demonstrator

Weymouth District of No. 4 (Bournemouth) Sub-Area. Salary N.J.C. Grade 1 (£500 × £20 to £600 per annum). N.J.C. conditions of service.

Applicants should be qualified to advise generally on the utilisation of electric domestic appliances, to give public demonstrations of apparatus, and to assist in showroom duties. The possession of an E.A.W. Certificate or equivalent domestic science qualification would be an advantage.

Applications on forms obtainable from the Sub-Area Secretary, 1, Priory Road, Bournemouth, and returned to him in envelopes suitably endorsed not later than 7th October, 1957.

Demonstrator

Greenford District of No. 1 (Southall) Sub-Area. Salary N.J.C. Grade 1 (£500 × £20 to £600 per annum, plus £40 per annum London weighting). N.J.C. conditions of service.

Applicants should be qualified to advise generally on the utilisation of electric domestic appliances, to give public demonstrations of apparatus, and to assist in showroom duties. The possession of an E.A.W. Certificate or equivalent domestic science qualification would be an advantage.

Applications on forms obtainable from the Sub-Area Secretary, 2/6, Windmill Lane, Southall, Middlesex, and returned to him in envelopes suitably endorsed not later than 7th October, 1957.

The successful candidates for the above appointments will be required to contribute to the C.E.A. and Area Boards (Staff) Superannuation Scheme, if eligible. 641

STATION SUPERINTENDENTS

required for ELECTRICITY DEPARTMENT by GOVERNMENT OF SIERRA LEONE on contract for two tours of 18 to 24 months in first instance.

Salary according to qualifications and experience in scale (including expatriation pay) £859 rising to £1,359 a year. Gratuity at rate £100/£150 a year. Outfit allowance £60. Free passages for officer and wife; also for two children under age 19 or grant up to £150 annually for maintenance in U.K. Liberal leave on full salary.

Candidates, under 40 years of age, must (a) possess M.O.T. Steam and Diesel Certificate or equivalent qualification, or (b) have had engine room and boiler room watchkeeping and maintenance experience, or (c) have served appropriate apprenticeship followed by several years' responsible experience in operation, maintenance and development of steam turbine and diesel engine power stations. Knowledge of power station electrical equipment desirable.

Write to the Crown Agents, 4, Millbank, London, S.W.1. State age, name in block letters, full qualifications and experience, and quote M2C/42199/EF. 610

CENTRAL ELECTRICITY AUTHORITY

South Western Division

(a) STATION SHIFT CONTROL ENGINEER,
Newton Abbot Power Station.

Superannuation scheme. Salary N.J.B. Class F, Grade 10, £740 - £785 plus 10% shift allowance.

Candidates should possess good technical qualifications and have had training and experience in the control and operation of steam generating plant and main switchgear.

(b) FOURTH ASSISTANT ENGINEER,
Transmission Department at Divisional Headquarters, Bristol.

Superannuation scheme. Salary N.J.B. Class AX/CX, Grade 5, £810-£935/£985.

Construction engineer required to assist in the co-ordination and supervision of high voltage overhead line contracts. Experience in survey and in the design of profiles for such lines would be an advantage.

(c) STATION SHIFT CONTROL ENGINEER,
Feeder Road Power Station, Bristol.

Superannuation scheme. Salary N.J.B. Class E, Grade 10, £685-£730 plus 10% shift allowance.

Candidates should possess good technical qualifications and have had training and experience in the control and operation of steam generating plant and main switchgear.

(d) ENGINEERING DRAUGHTSMEN,
Transmission Department, Divisional Headquarters, Bristol, for general engineering work in connection with the construction and maintenance of high voltage substations and overhead lines.

Superannuation scheme. Salary N.J.B. Schedule D, Grade 5 or 6, £595-£860, according to qualifications and experience.

(e) CARTOGRAPHICAL DRAUGHTSMAN or DRAUGHTSWOMAN required in the Transmission Department, Divisional Headquarters, Bristol, for general work in connection with the construction and maintenance of high voltage transmission system.

Superannuation scheme. Salary N.J.C. Grade 1 or 2, £500-£675, according to experience.

Applications on form A.E.6/ACT obtainable from the Divisional Secretary, 26, Oakfield Road, Bristol, 8, should be completed and returned by 3rd October, 1957, for vacancies (a), (b) and (c), and 8th October for (d) and (e). 648

CENTRAL ELECTRICITY AUTHORITY

London Division

Transmission Department

APPLICATIONS are invited for the following superannuable posts. Conditions of service in accordance with N.J.B. Agreement, Schedule B and D. Salary includes London allowance.

THIRD ASSISTANT ENGINEER
(Vacancy No. 57/862).

Applicants should preferably be Corporate or Graduate Members of the I.E.E. or equivalent and should have experience in design, layout and site installation of high-voltage substation equipment, together with knowledge of site testing and commissioning of substation plant. Salary Class AX/EX, Grade 4 = £945/£1,190 per annum.

THIRD ASSISTANT ENGINEER
(Vacancy No. 57/863).

Applicants should have sound practical experience in construction of high-voltage overhead line and cable systems and carrying out and plotting of level and theodolite surveys; should preferably be Corporate or Graduate Members of the I.E.E. or equivalent. Salary Class AX/EX, Grade 4 = £945/£1,190 per annum.

ENGINEERING DRAUGHTSMAN
(Vacancy No. 57/864).

Applicants should have received good general education and general drawing office experience covering preparation of cable route records and surveying of cable routes and training in preparation of substation layouts and site surveying. Salary Schedule D, Grade 6 = £635/£755 per annum.

Applications, quoting vacancy number, to (or on form from) Central Electricity Authority, London Division, P.O. Box 136, London, W.1, by 7th October, 1957. 604

EAST MIDLANDS ELECTRICITY BOARD

Fourth Assistant District Engineer, Lincoln District, Lincolnshire Sub-Area

APPLICATIONS are invited for the appointment of a FOURTH ASSISTANT DISTRICT ENGINEER in the Lincoln District of the Lincolnshire Sub-Area.

Applicants should preferably possess a technical qualification equivalent to the Higher National Certificate in Electrical Engineering and have had experience in the construction, operation and maintenance of overhead and underground distribution systems up to and including 11 kV. Ability to drive a motor vehicle is essential.

The salary and conditions of the appointment will be in accordance with the National Joint Board Agreement, Class F, Grade 13 (£590-£635 per annum).

Applications stating age, qualifications, education, experience and details of present appointment should be forwarded to the District Manager, Lincoln District, Brayford Side North, Lincoln, so as to reach him within fourteen days of the date of this advertisement. 592

'ENGLISH ELECTRIC'

Stafford

MOBILE LABORATORY STAFF

THE company wishes to appoint two young Electrical Engineers to its Development Engineering staff at Stafford.

The work provides an excellent opportunity of acquiring a wide experience of :—

HEAVY ELECTRICAL MACHINES (up to 100 MW)

SWITCHGEAR (up to 275 kV)

TRANSFORMERS (up to 300 MVA)

RECTIFIERS

as well as gaining experience in light current and electronic test techniques on these products.

Visits throughout the country and sometimes abroad are frequently involved in connection with on-site development or installation observations and testing.

Although a large proportion of this work is at Stafford, applicants should be prepared to undertake duties involving a high degree of mobility.

If you have a Higher National Certificate (Electrical) or higher qualification, and feel that you are suited to work in this field, please write, giving full details to—

Central Personnel Services,

336/7, Strand, London, W.C.2,

quoting Ref. ER.1295C.

583

EASTERN ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments. The successful candidates will be required to contribute to a superannuation scheme and may be required to undergo a medical examination.

Chilterns Sub-Area

SUB-AREA HEADQUARTERS, BEDFORD. FOURTH ASSISTANT ENGINEER (124/57.N.).

Applications are invited for the above position in the Operation and Maintenance Section of the Sub-Area Engineer's Department.

Duties will include assistance in the commissioning of substations up to 33 kV, pressure testing, fault location and calculation of protective gear settings.

Salary N.J.B. Class L, Grade 13 (£835-£880).

Apply by letter within 14 days, to the Manager, Chilterns Sub-Area, Eastern Electricity Board, Prebend Street, Bedford.

HEMEL HEMPSTEAD DISTRICT. FOURTH ASSISTANT ENGINEER (125/57.R.).

Candidates should have had a sound technical training and suitable experience in the construction, operation and maintenance of H.V. and L.V. overhead and underground systems, including substations.

Salary N.J.B. Class F, Grade 11 (£685-£730).

Apply by letter within 14 days, to the District Manager, Eastern Electricity Board, Bridge Street, Hemel Hempstead.

Northmet Sub-Area

ST. ALBANS DISTRICT. THIRD ASSISTANT ENGINEER (Ref. 705) (122/57.R.).

Candidates should have had a sound technical training and suitable experience in the construction, operation and maintenance of H.V. and L.V. distribution systems including substations.

Salary N.J.B. Class F. Grade 9 (£790-£835).

Apply by letter to F. J. Drake, Assoc.I.E.E., The Manager, Eastern Electricity Board, 107, St. Peter's Street, St. Albans, Herts, by 7th October, 1957. 652

IMPERIAL CHEMICAL INDUSTRIES LIMITED

Wilton Works

ENGINEERING DESIGNERS

who possess Higher National Certificate or its equivalent, and have experience in the following branches of engineering :

MECHANICAL, CIVIL,
ELECTRICAL, STRUCTURAL,

are required to fill immediate vacancies in the Design Office working on the development of this 2,000-acre factory site, at which is centred much of the company's large expansion programme.

HOUSING : After joining the staff married men will receive a reasonable refund of removal (including travel) expenses and, to assist them in house purchase, facilities are available in approved cases for substantial loans. In addition, legal charges will be advanced. A lodging allowance will be paid for a period to married men selected for these appointments whilst maintaining two homes.

COMMENCING SALARIES : These vary between £535 and £1,000 per annum according to age, experience and qualifications.

The Design Offices are situated in the parklands of Wilton Castle, which lies at the foot of the Cleveland Hills.

Please write to me : Staff Manager, Imperial Chemical Industries Limited, Wilton Works, Middlesbrough, Yorkshire, quoting reference 425/6.

612

BRITISH KLOCKNER SWITCHGEAR LIMITED

Chertsey, Surrey

TECHNICAL SALES ENGINEERS required for London and Home Counties. Knowledge of motor control gear; sales experience preferred but not essential. Apply giving full particulars to—Managing Director. 166

***Situations Vacant** (continued)*

WEST MIDLANDS GAS BOARD

Birmingham and District Division

Vacancy for Electrical Engineering Assistant

THE position involves supervision of a planned maintenance scheme, preparation of specifications for new electrical installations, control of skilled and semi-skilled labour and commissioning of new plant. The successful candidate will be responsible to the Divisional Electrical Engineer for the maintenance of continuity of electricity supplies and operation of electrical plant through gas works in the Birmingham and District Division.

Applicants should hold as a minimum qualification the Higher National Certificate in Electrical Engineering, preferably be a Corporate Member of the Institution of Electrical Engineers, and have had experience in heavy industrial or chemical electrical engineering.

A flat, adjacent to one of the gas works, may be available at a reasonable rent as temporary accommodation.

The salary will be within A.P.T. Grades 11-12 of the National Salary Scales for Gas Staffs (£895-£1,070 per annum) according to qualifications and experience. The post is pensionable and the successful candidate may be required to pass a medical examination.

Applications stating age, experience and qualifications should be addressed to Mr. J. E. Wakeford, Divisional General Manager, West Midlands Gas Board, Gas Offices, Edmund Street, Birmingham, 3, to reach him not later than the 12th October, 1957.

J. SWAN,
Secretary to the Board.

579

Applications are invited by

SIMPLEX ELECTRIC COMPANY LIMITED

for engineers to join their

CREDA DESIGN CENTRE

in London (adjacent Alperton Underground Station). These vacancies present genuine opportunities for original work and the backing of a large well-equipped production plant. Present requirements are for :—

SENIOR DESIGNERS with experience of cookers or water heaters or other appliances. Applicants should have broad experience and be capable of taking responsibility for major developments.

DRAUGHTSMEN with experience of domestic appliances and sound knowledge of design for modern production methods.

SENIOR DEVELOPMENT ENGINEERS with a record of successful projects in the design of motorised or static domestic appliances.

Written applications with full details of industrial experience to date and salary expected will be received in strict confidence by the Secretary, Simplex Electric Company Ltd., Oldbury, Birmingham. Interviews can be arranged in London or Birmingham.

594

BRITISH KLOCKNER SWITCHGEAR LIMITED

Chertsey, Surrey

ESTIMATOR for TECHNICAL SALES. Correspondence and capable of preparing control schemes involving automatic motor control gear. Experience essential.

CIRCUIT DIAGRAM DRAUGHTSMAN. Preferably experienced in preparing automatic control gear schemes.

Applicants to have O.N.C. (Electrical). Excellent opportunities with fast growing concern. Pension scheme. Apply to Managing Director, stating experience and present salary.

165

CITY OF SALISBURY, SOUTHERN RHODESIA

Vacancy for Traffic Control Electrician

APPLICATIONS are invited from suitably qualified persons for the vacancy of TRAFFIC CONTROL ELECTRICIAN.

Candidates must have experience of and be capable of carrying out all work on electrical street traffic control equipment.

Wages are £21 12s. for a 48-hour week. No cost-of-living or other allowances are payable and overtime is at prescribed rates.

The successful applicant must comply with the requirements of the Immigration Authorities and will be required to submit to the Council a satisfactory medical certificate of fitness.

Applicants should submit full particulars of their qualifications, training and experience, giving details of positions held, age, nationality, place of birth and marital state. Copies of not more than three recent testimonials may be attached.

Forms of application and further particulars may be obtained from Davis & Soper Ltd., 52 and 54, St. Mary Axe, London, E.C.3, to whom applications should be sent to arrive not later than 18th October, 1957. 654

THE NUCLEAR POWER PLANT CO. LTD.

A SENIOR ENGINEER

required

to be responsible for the design of H.V. and L.V. systems for Nuclear Power Stations at home and abroad.

The work will include the overall design and layout of these systems and the preparation of specifications for switchgear, transformers, motor starting equipment, protective gear cables, and control of alarm equipment.

Applicants should have a degree or equivalent qualification in electrical engineering, backed by no less than five years' practical experience in this field.

The successful candidate will work at Booths Hall, Knutsford, and if necessary will be given assistance with house purchase.

Written applications giving full details of age, qualifications and career to date to be sent to—

The Secretary
THE NUCLEAR POWER PLANT CO. LTD.
Booths Hall
Knutsford, Cheshire

Quote reference ER/CRD/19

628

UNIVERSITY OF NOTTINGHAM

Buildings Department

JUNIOR ELECTRICAL ENGINEERING DRAUGHTSMAN required, with experience of lighting and power installations in large buildings. Commencing salary £600/£650 per annum, according to age and experience. Contributory pension scheme.

Forms of application from the Registrar, University Park, Nottingham. 578

LANCASHIRE DYNAMO GROUP OF COMPANIES

Sales Engineering Appointments

THE expansion of the Lancashire Dynamo Group's selling organisation provides a number of good opportunities for SALES ENGINEERS in all kinds of industrial electrical equipment.

These appointments, in a progressive group with an excellent pension scheme and good prospects for advancement, are open to engineers with experience in the electrical industry and having H.N.C. standard of technical education.

Applications are invited from candidates with sales or works experience in one or more of the following categories :—

ELECTRICAL ROTATING MACHINERY.
TRANSFORMERS.
RECTIFIERS.
SWITCHGEAR.
INDUSTRIAL ELECTRONIC EQUIPMENT.

Salary will be up to £1,250 per annum, depending on experience and qualifications, and a car will be provided where needed.

The immediate vacancies are at the Sales Offices in Manchester, Birmingham and Leeds, but similar appointments are likely in other areas.

Applications will be treated in strict confidence and should be sent to the Secretary, Lancashire Dynamo Group Sales Ltd., St. Stephen's House, Victoria Embankment, Westminster, S.W.1, giving full personal details, including education, training and experience.

613

CITY COUNCIL OF SINGAPORE

Electricity Department

APPLICATIONS are invited for appointment of ASSISTANT DISTRICT ENGINEER on agreement for 3 years.

Applicants must be Graduates of the Institution of Electrical Engineers or equivalent, and must have experience in underground and overhead transmission and distribution networks, substations, transformers, switchgear and low voltage mains involving planning, layout, operation and maintenance. Minimum age 25 years.

The salary scale of the post is $1,055 a month rising by annual increments of $45 to $1,145 a month ($1 Malayan = 2s. 4d.).

Expatriation and variable allowances are also payable. Total emoluments on the salary of $1,055 a month are $1,370 a month (£1,918 per annum) for a single man, $1,460 a month (£2,044 per annum) for a married man with no children, and $1,596 a month (£2,235 per annum) for a married man with one or more children. Gratuity equivalent to 20% of basic salary is payable on satisfactory completion of the 3 years' resident service.

Partly furnished quarters at a rental of 12½% of basic salary provided if available. Free passages for officer appointed and family subject to certain limits.

Further details from the Council's London Agents: Messrs. Allen & Williams, 1, Victoria Street, Westminster, London, S.W.1. Closing date for full applications in DUPLICATE, Tuesday, 22nd October, 1957. 643

AIR MINISTRY

WORKS Designs Branch requires in London and Provinces ELECTRICAL ENGINEERING DRAUGHTSMEN experienced in preparation of schemes for illumination and electrical equipment of buildings or in electrical distribution, H.V. and M.V. Technical training to O.N.C. standard or equivalent an advantage.

Salaries in London up to £1,015 per annum. Somewhat lower in Provinces. Starting pay dependent on age, qualifications and experience. Long-term possibilities with promotion and pensionable prospects. 5-day week. 3 weeks' 3 days' leave a year. Liability for overseas service. Normally natural-born British subjects.

Write stating age, qualifications, employment details including type of work done, to any Employment Exchange, quoting Order No. Borough 604. 260

BOROUGH POLYTECHNIC
Borough Road, London, S.E.1

Principal: James E. Garside, M.Sc.Tech., Ph.D., F.R.I.C., F.I.M., M.Inst.F.

APPLICATIONS are invited for the following posts in the Department of Electrical Engineering and Physics :—

ASSISTANT LECTURER (Grade B).
Applicants should be graduates in electrical engineering and/or hold equivalent professional qualifications. Teaching duties largely in connection with H.N.C. and O.N.C. courses, but if suitably qualified could also participate in Dip. Tech. courses.

ASSISTANT LECTURER (Grade A).
Minimum qualification Grad. I.E.E. Teaching duties largely with O.N.C. and equivalent classes.

For both posts teaching and/or industrial experience in electrical engineering is required.

Salary :—
Grade B: £650 × £25 to £1,025 p.a. plus London allowance.
Grade A: £475 × £25 to £900 p.a., plus London allowance.

Commencing salary above minimum of scale determined by teaching and/or industrial experience, training and qualifications.

Further particulars of the above posts and forms of application available from the undersigned.

FREDK. J. PACKER,
Clerk to the Governing Body.
608

MANAGEMENT SELECTION LIMITED

have been retained to advise on the appointment of a

SALES EXECUTIVE

for a London company manufacturing the full range of electrical accessories. In this specialised and competitive field the company intends to consolidate its lead by increasing the volume of its products and by introducing and developing new lines. The Sales Executive will be responsible to the Managing Director for all home sales.

Candidates must have direct experience of the electrical accessory trade either in sales management or as manufacturer's agent, wholesaler or chief buyer. Preferred age 35 to 40. Initial remuneration about £2,000, with pension scheme and expenses.

Please send brief details in confidence, quoting reference M.566, to P. J. H. Fryer, Management Selection Limited, 17, Stratton Street, London, W.1. No information will be disclosed to our clients until candidates know their identity and have given permission after personal discussion.

576

FEDERATION OF RHODESIA AND NYASALAND
Federal Power Board

THE Board require the services of a fully qualified ELECTRICAL CONSTRUCTION ENGINEER. The Board are at present constructing at the Kariba Gorge on the Zambesi a large dam and power station having an initial capacity of 500 MW and an ultimate capacity of at least 1,200 MW. The Board are also constructing about 930 miles of 330-kV transmission line to connect the Kariba power station with a number of thermal stations in the Federation. The electrical construction engineer is required in connection with the design, construction and installation of electrical and mechanical plant for the Board's system and should have had experience of similar work. Some knowledge of protective gear, metering and telecommunications would be an added advantage.

Salary £2,500 per annum. There is a pension scheme which the successful applicant will be required to join.

Applications should be posted so as to reach the Secretary, Federal Power Board, Reliance House, P.O. Box 630, Salisbury, Southern Rhodesia, not later than 31st October, 1957.

505

MIDLANDS ELECTRICITY BOARD

APPLICATIONS are invited for the following superannuable posts :—

Worcester and District Sub-Area

GENERAL ASSISTANT ENGINEER
(Headquarters).

The successful applicant will be required to assist in investigating load flows, fault levels, protection, etc., the compilation of statistics, and in the checking of general distribution schemes. Technical qualifications desirable. Salary £685/£730 per annum (N.J.B. Grade K.15).

Apply, by letter, within fourteen days, stating age, qualifications, experience, present position and salary to Mr. R. Mallet, Sub-Area Manager, Midlands Electricity Board, Whittington, Worcester.

Wolverhampton and District Sub-Area

GENERAL ASSISTANT DISTRICT COMMERCIAL ENGINEER
(Walsall District).

Applicants should have had a sound technical training with practical experience in the sale, installation and maintenance of electronic equipment, including radio and television receivers. Salary £740/£785 per annum (N.J.B. Grade G.11).

Apply, by letter, within seven days, stating age, qualifications, experience, present position and salary to Mr. D. Holt, Sub-Area Manager, Midlands Electricity Board, 83, Darlington St., Wolverhampton.

A. STEPHENS,
Secretary. 651

SOUTH WALES SWITCHGEAR LIMITED
Blackwood, Mon.

WE invite applications from capable young men possessing drive and initiative for the following positions in our rapidly expanding organisation. Candidates should preferably possess a Higher National Certificate or equivalent qualification, but good experience in one or more of the following fields is considered to be of prime importance.

DESIGN DRAUGHTSMEN.

Experienced in the design of H.V. switchgear and associated equipment.

CONTRACTS DRAUGHTSMEN.

With experience in the application and layout of switchgear in one or more of the following fields : Outdoor and indoor substations, power station and industrial switchgear, generator busbar trunking.

DIAGRAMS DRAUGHTSMEN.

Experienced in the layout and detail of protective and control systems, etc., covering all types of switchgear applications.

The vacancies occur in a modern factory, located in pleasant surroundings within easy access of Cardiff and Newport.

Applications, which will be treated in the strictest confidence, should be addressed to the

PERSONNEL MANAGER.

614

SOUTH WALES ELECTRICITY BOARD

COMMERCIAL ASSISTANT required, District 348 (Cardiff West) in the Central Sub-Area of the Board.

Salary Class E, Grade 9 (£740/£785) of the N.J.B. Schedule.

Applications stating age, present position and salary, qualifications, experience, and three referees, should be addressed to the Secretary (Establishments Section), St. Mellons, Cardiff, to arrive by 7th October, 1957. 591

BRITISH ELECTRICAL DEVELOPMENT ASSOCIATION

APPLICATIONS are invited for the following appointments :—

(a) CHIEF TECHNICAL OFFICER.
Applicants should possess a sound technical training, including University Degree in Science or Engineering and/or Corporate Membership of the Institution of Electrical Engineers, and have general experience in the supply and utilisation of electricity for all purposes in domestic and commercial premises, industry and farms. Advertising or publicity experience will be an advantage. Salary within range £2,000-£2,500, according to experience and qualifications.

(b) INDUSTRIAL ELECTRIC HEATING ENGINEER.
Applicants should have experience of various types of industrial electric heating equipment, including furnaces, resistance heaters and high-frequency heaters, and of their practical application in factories and works. It will be an advantage for candidates to possess a University Degree in Science or Engineering. Salary within range £1,300-£1,600, with starting point according to experience and qualifications.

Applications stating age, qualifications and experience, and salary required should be addressed, not later than 16th October, to the Director and Secretary, British Electrical Development Association, 2, Savoy Hill, London, W.C.2. 577

ASSISTANT ELECTRICAL ENGINEER
East African Railways and Harbours Administration

FOR general duties in the Railway and Harbour Administration. Appointment on agreement for two years with prospect of permanency. Salary range £1,170-£1,765 p.a. Free furnished quarters if available, and free passages for officer, wife and family up to cost of three adult fares in all. Generous leave, low taxation.

Candidates must be between 25 and 35 and must have obtained a degree or diploma in electrical engineering at a university or college recognised by the Institution of Electrical Engineers, and have become at least graduate members of that Institution ; they must in addition have served an apprenticeship of not less than two years with a firm of electrical engineers or other organisation of good standing, followed by at least a further two years' experience, particularly in electricity supply and workshops installations. Alternatively, candidates must have served a full apprenticeship in electrical engineering, have become Graduate Members of the Institution of Electrical Engineers, and had at least four years' experience of the nature indicated subsequent to apprenticeship. Knowledge of electric or diesel electric traction would be an advantage.

Write Director of Recruitment, Colonial Office, London, S.W.1, stating age, qualifications and experience. Quote BCD.173/015. 593

UGANDA ELECTRICITY BOARD

APPLICATIONS are invited for the post of PUBLIC RELATIONS OFFICER on the permanent Head Office staff.

The Board's distribution network is rapidly expanding and is reaching rural areas inhabited by people with little knowledge or understanding of the benefits or uses of electricity.

The person appointed will be responsible for suitable publicity in such areas, the preparation of pamphlets, and for publicising the Board's work, plans and policies throughout Uganda, in the United Kingdom, and in other countries.

Applicants must have had considerable public relations and press experience.

Commencing salary will be paid according to age, experience and qualifications, but will not be less than £1,350 per annum.

Uganda has a pleasant climate and income tax is moderate. Maximum tour three years. 5 days' vacation leave on full salary for each month of service, plus local leave. Up to three adult passages provided to and from Uganda. Free partly furnished accommodation, medical and dental treatment. Provident fund or pension facilities available.

Application forms and further information may be obtained from the London Representative, Uganda Electricity Board, 27, Regent St., London, S.W.1, to whom completed forms should be returned not later than 21st October.

580

***Situations Vacant** (continued)*

CITY OF SALISBURY SOUTHERN RHODESIA ELECTRICITY UNDERTAKING

Vacancy for Technical Assistant, Grade 2

APPLICATIONS are invited for the fixed establishment post of TECHNICAL ASSISTANT, GRADE 2, at the power station of the above-mentioned undertaking. Salary scale is £1,100 × £50 to £1,250 per annum commencing salary at the minimum. No cost-of-living or other allowances are payable.

Applicants must have had extensive experience in the calibration, repair and maintenance of instruments and control gear as used for steam power plant.

The successful candidate must be able to comply with the requirements of the Immigration Authorities, and will be required to submit to the Council a satisfactory medical certificate of fitness.

Applicants should submit full particulars of their technical education, qualifications if any, training and experience. Details of age, place of birth, nationality and marital state should be given and copies of not more than three recent testimonials may be included.

Further particulars regarding conditions of service, leave entitlement, allowances towards travelling and removal expenses are obtainable from Davis & Soper Ltd., 52 and 54, St. Mary Axe, London, E.C.3, to whom applications must be submitted on or before 11th October, 1957. 533

CENTRAL ELECTRICITY AUTHORITY

Southern Division

APPLICATIONS are invited for the following positions :—

GENERAL ASSISTANT ENGINEERS (S/13.952).

Applicants should have served an apprenticeship or had practical training suitable to the industry. They should possess a sound general and technical education, and preference will be given to those possessing a Higher National Certificate (or those nearing completion of H.N.C. courses). Opportunities are available for general assistant engineers to complete their studies and gain wide experience with good prospects of promotion.

The duties of those appointed will vary, but will include as a general rule, the operation and control, under supervision, of generating plant. There are a number of these vacancies at generating stations in this Division.

Vacancies also exist for those who wish to specialise in maintenance of electrical and mechanical generating plant, transmission lines, substations and cables, or generating station construction work.

Salary N.J.B. within scales £540-£730.

Special application forms for the above vacancies obtainable from P. D. A. Oliver, Divisional Secretary, 111, High Street, Portsmouth, should be returned by 9th October, 1957. 650

SOUTH OF SCOTLAND ELECTRICITY BOARD

APPLICATIONS are invited for two positions as SECOND ASSISTANT ENGINEERS (System Design) in the Chief Engineer's Department at Board Headquarters.

The successful applicants will be engaged on the design of the Board's distribution system. Applicants should have had previous experience in the construction or operation of distribution systems, and some experience in the design of such systems would be an advantage. They should possess an engineering degree or qualifications for Corporate Membership of the Institution of Electrical Engineers.

Salary N.J.B. Schedule B, Class AX/DX, Grade 2, £1,145/£1,375 per annum. The positions are superannuable.

Applications should be made on the standard form, which may be obtained from the undersigned, and should be returned not later than Saturday, 12th October, 1957. Please quote reference No. E47/57.

ANDREW A. WALLACE,
Secretary.
P.O. Box 173,
351, Sauchiehall Street,
Glasgow, C.2.
16th September, 1957. 627

ELECTRICAL ENGINEERS

Public Works Department Federation of Nigeria

THE design, supervision and maintenance of electrical installations in Government buildings, hospitals, staff quarters, etc. The investigation and application of modern forms of electrical wiring to tropical conditions is a particular duty of the appointment. These duties will be carried out under the supervision of the senior electrical engineer.

Contract appointment in the salary range £1,290 to £1,962 p.a., plus a gratuity of £37 10s. for each 3 months' satisfactory service. Quarters if available at low rental. Free passages for officer and wife, and children up to cost of two adult fares or an allowance of £75 for each of two children maintained in U.K. Free medical and dental treatment.

Candidates between 28 and 45 must be A.M.I.E.E., or be exempt from the Institution's examinations. They should have had experience in all classes of installations from estimates to completion of large buildings and of oil engine standby generating plant. A knowledge of tariffs and power factor correction would be an advantage.

Write stating age, qualifications and experience to Director of Recruitment, Colonial Office, London, S.W.1. Quote BCD 112/14/014. 645

RESIDENT ENGINEER FOR SARAWAK

AN Engineer is required to supervise the construction of a new diesel engine power station and 11-kV distribution system in Sarawak.

The duties will comprise supervision of the work of civil, mechanical and electrical contractors, and the testing and commissioning of the entire scheme.

A qualified civil engineering assistant will be available.

Applicants, who should not be less than 35 years of age, must be chartered electrical and/or mechanical engineers with previous experience in a similar capacity.

Salary will be $1,800 per month ($ = 2s. 4d.) with free furnished accommodation, medical attention and first class travel to and from Sarawak. There is no personal income tax at present in Sarawak.

Applications should be made to Preece, Cardew & Rider, 8, 10 & 12, Queen Anne's Gate, Westminster, London, S.W.1, not later than 5th October, 1957.

611

BRITISH THOMSON-HOUSTON CO. LTD.

THE BRITISH THOMSON-HOUSTON Co. Ltd. has a vacancy for a GRADUATE PHYSICIST or ELECTRICAL ENGINEER who is free from National Service obligations in their Research Laboratory at Rugby, to assist in the development and evaluation of insulation for medium and high-voltage applications. The work covers a wide and interesting field and includes the determination of the physical properties of materials and the development and functional evaluation of composite insulation. Previous experience of this type of work is not essential.

Applicants are invited to write to the Director of Research, The British Thomson-Houston Co. Ltd., Rugby, giving particulars of education and experience, and quoting reference SR7.

563

CENTRAL ELECTRICITY AUTHORITY

South Eastern Division

APPLICATIONS are invited for the following positions to undertake day duties and/or shift duties at Thames South Grid Control Centre.

THIRD ASSISTANT ENGINEER. Applicants should preferably have practical experience in the operation and control of an interconnected power system and/or in the operation of power station plant. Sound technical training required. Graduate membership of recognised engineering institution or comparable qualifications an advantage.

N.J.B. conditions of service, salary AX/EX, Grade 4, £895-£1,140 per annum plus 10% shift enhancement when applicable.

FOURTH ASSISTANT ENGINEERS. Applicants should have had experience of control centre duties or recent power station or transmission experience. Technical training preferably to O.N.C. level. Salary Class AX/EX, Grade 5, £810-£1,035 per annum or Grade 6, £710-£935 per annum plus 10% shift enhancement when applicable, according to qualifications and experience.

Applications, giving details of education, present position, experience, etc., should be sent to the Establishments Officer, Central Electricity House, Lower Ham Road, Kingston-on-Thames, Surrey, so as to arrive by 7th October, quoting reference (205). 649

EXECUTIVE ENGINEER (ELECTRICAL AND MECHANICAL)

Public Works Department, Somaliland Protectorate

TO be responsible under the Director of Public Works for the construction, running and maintenance of small electrical generating stations up to 500 kVA output. The organisation of mechanical workshops and the servicing of 300 vehicles and roadmaking plant.

Appointment on agreement for two tours of 18-21 months, with prospect of pensionable permanency. Gross emoluments in incremental scale £852-£1,620 per annum, plus cost-of-living allowance of approx. 10% of salary.

Free passages; quarters provided at low rents; generous home leave; no income tax. Education allowance for children between 8 and 18 years of age.

Starting salary will be determined by experience in excess of the minimum mentioned below and National Service in the Forces.

Candidates should have either A.M.I.E.E. or A.M.I.Mech.E., and have 5 years' practical experience on electrical and mechanical work, preferably electrical generation and transmission.

Apply Director of Recruitment, Colonial Office, London, S.W.1. Give brief details of age, qualifications and experience. Quote BCD.112/5/02. 584

LINDSEY (LINCOLNSHIRE) COUNTY COUNCIL

ELECTRICAL ENGINEERING ASSISTANT, Grade A.P.T. II £725/£845. Should be capable of preparing drawings in connection with electrical installations in schools. Higher National Certificate required. In special circumstances consideration will be given to starting salary not more than two steps up the grade.

N.J.C. conditions of service. Canvassing will disqualify. Candidates must disclose in writing whether to their knowledge they are related to any member or senior officer of the Council.

Applications giving age, qualifications, experience, present salary, and the names of at least two persons to whom reference can be made, to be sent not later than 8th October, to the County Architect, County Offices, Lincoln. 642

ELECTRICAL ENGINEER

required (aged 30-45, preferably Chartered), to assume progressive leading position, at attractive commencing salary, in design office of London company. Applicants must be fully conversant with low and medium voltage automatic contactor gear, motors, relay systems, and methods of temperature control. Previous D.O. experience and a thorough knowledge of wiring systems applied to precision machinery is essential. Write in first instance—Personnel Manager, Molins Machine Co., Ltd., Evelyn Street, London, S.E.8. 7485

THE POLYTECHNIC
309, Regent Street, London, W.1

ELECTRICAL ENGINEERING DEPARTMENT

APPLICATIONS are invited for a post as LECTURER in Electrical Engineering subjects, to take up duties on 1st January, 1958.

Candidates should possess a University Degree in Electrical Engineering or equivalent qualification and have had suitable industrial experience. Ability to teach electric power and/or machines up to degree standard will be an advantage.

Salary in accordance with the Burnham (Further Education) Scale for Lecturer, which commences at £1,200, rising by increments of £30 to a maximum of £1,350, plus London allowance of £36 or £48 per annum.

A form of application, which should be returned by not later than 11th October, may be obtained from the undersigned.

J. E. RICHARDSON,
Director of Education.

615

LONDON ELECTRICITY BOARD
Demonstrator (Female)

APPLICATIONS are invited for the above position in the Board's Eastern District at Stratford, London, E.15.

Applicants should be suitably qualified, holding the E.A.W. or other approved certificate including electrical housecraft, and having experience in conducting demonstrations at service centres and in general service centre duties. They should also be experienced in advising consumers on the selection and use of domestic appliances, both at the service centre and on consumers' premises.

The post is graded within the National Joint Council Agreement (Administrative and Clerical Grades) as Grade 1, i.e., £500 to £600 per annum, plus the appropriate London Area allowance.

Application forms obtainable from Personnel Officer, 46, New Broad Street, London, E.C.2, to be returned completed by 8th October, 1957. Please quote ref. PER/2365/R. 581

CHIEF DESIGN ENGINEER
MOTOR CONTROL GEAR

ESTABLISHED manufacturing company requires engineer experienced in design of contactors and auxiliaries, capable of producing, if necessary from theoretical considerations, electrically and mechanically sound designs which accord with modern manufacturing techniques.

Wide knowledge of applications essential.

Senior executive position, carrying appropriate salary, etc.

Write, giving details of age, experience and qualifications, to—Box 629.

MIDDLESEX COUNTY COUNCIL

THE following vacancies exist within the Organisation and Methods Division of the Clerk's Dept.

(a) 2 posts in Apt. IV (£992 rising at 1st April, 1958, to £1,055 × £50 to £1,205 p.a.).

(b) 2 posts in Apt. III (£817 15s. rising at 1st April, 1958, to £875 × £35 (4) × £40 to £1,055 p.a.).

Officers appointed required to work as part of team engaged on both organisation and methods reviews and staff inspection. Must possess high degree of tact and initiative and be able to apply logical and analytical approach to problems. Established. Subject to medical assessment. Prescribed conditions.

Apply to the Clerk (ref. C/O & M), Guildhall, Westminster, London, S.W.1, stating post required, age, experience, qualifications, present salary and giving names of three referees, by 12th October (quote W.149 ER). Canvassing disqualifies. 639

CENTRAL ELECTRICITY AUTHORITY
Eastern Division

APPLICATIONS are invited for the following post :—

STATION SHIFT CONTROL ENGINEER, BEDFORD GENERATING STATION.

Salary Class D, Grade 10, £635 × £15 to £680 per annum plus 10% for shift work duties.

Applicants should have reached the standard of Ordinary National Certificate in Electrical Engineering, or equivalent, have experience in the operation of a switchboard at a generating station, and be fully conversant with high-voltage switching operations and protective systems.

Applications stating age, qualifications and experience should be sent to the Controller, Central Electricity Authority, Eastern Division, West Farm Place, Chalk Lane, Cockfosters, Barnet, Herts, by 5th October, 1957.

W. N. C. CLINCH,
Controller. 625

RESEARCH AND DEVELOPMENT ENGINEERING

THE Instruments Division of a well-established group of companies requires Senior and Junior technical staff for the development of novel projects in the field of remote control, telemetering, cybernetic relay systems and transistor-operated devices (for civil application exclusively). The type of development experience sought includes :—

Electronics, with tape and wire recording devices.

Pulse and relay techniques.

Contractor, relay and control gear circuitry.

The work is based in London. Candidates should have had sound technical experience in some of these fields and have attained or be aiming at professional qualifications in natural science or electrical technology. Contributory pension scheme.

Write giving details of education, career and salary sought to — Box ER.523, c/o 191, Gresham House, London, E.C.2.

630

INSTRUMENT MECHANICS

required

for the maintenance and repair of a wide range of industrial instruments in a large chemical works.

Candidates should preferably have served a recognised apprenticeship but this is not essential. There is a merit rating scheme in operation in the company which ensures that good tradesmen receive a high rate of pay. Canteen and excellent recreation facilities are available.

Applications in writing giving full history should be sent to:—

Labour and Welfare Officer (Oldbury)
ALBRIGHT & WILSON (MFG.) LIMITED
P.O. Box No. 3, Oldbury.

554

WEST ESSEX COLLEGE OF FURTHER EDUCATION
The High, Harlow, Essex

LECTURER, to be responsible for Electrical Engineering in this new College, required from 1st January, 1958.

Applicants should have suitable qualifications with appropriate teaching and/or industrial experience, and be prepared to initiate and develop a wide range of courses.

A house will be available in the New Town if required.

Salary scale £1,200 by £30 to £1,350.

Details and forms (stamped addressed foolscap envelope) obtainable from the Principal at the College. 653

YORKSHIRE ELECTRICITY BOARD
No. 5 (Wakefield) Sub-Area
WAKEFIELD DISTRICT

THIRD ASSISTANT DISTRICT ENGINEER. Applicants should have had a sound practical training and experience in construction, operation and maintenance of H.V. and M.V. overhead and underground distribution network, substation plant and ancillary equipment.

Candidates must be prepared to reside in the District and undertake standby duties, and should preferably have attained the technical standard of the Higher National Certificate in Electrical Engineering or equivalent qualifications.

Salary N.J.B. Class G, Grade 9, £835/£15/£880 per annum.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, No. 5 (Wakefield) Sub-Area, Yorkshire Electricity Board, not later than 11th October, 1957. 644

LONDON ELECTRICITY BOARD
Assistant Distribution Engineer

APPLICATIONS are invited for the above position in the Board's Eastern District at Stratford, London, E.15.

Applicants should have had a sound technical education, up to at least Higher National Certificate standard, preferably being Corporate Members of the I.E.E., and possess a practical experience of all branches of engineering work associated with the organisation of a District distribution department, particularly in regard to mains and substation work.

The post is graded under Schedule A of the National Joint Board Agreement as Class J, Grade 12, £830 per annum, rising to £885 per annum, inclusive of London allowance.

Application forms obtainable from Personnel Officer, 46, New Broad Street, London, E.C.2, to be returned completed by 16th October, 1957. Please quote ref. PER/2367/R. 582

CENTRAL ELECTRICITY AUTHORITY
North West, Merseyside and North Wales Division

APPLICATIONS are invited for the position of FOURTH ASSISTANT ENGINEER, Electrical Dept. (Development Section), Offerton, Stockport.

Salary within the scale £710/£835-£935 (AX/EX.6). Applicants should preferably possess an electrical engineering degree or qualifications admitting to Corporate Membership of I.E.E. Knowledge of power system technology and works experience of switchgear and/or protection desirable.

Applications, giving details of age, experience and qualifications, should be sent to Director of Labour and Welfare, Central Electricity House, 825, Wilmslow Road, Manchester, 20. Please quote Vacancy No. E.3/338/R. 606

THE DE HAVILLAND ENGINE COMPANY LIMITED

have a vacancy for a

MAINTENANCE ELECTRICIAN

Applicants should be experienced in the maintenance of electronically controlled machine tools.

Write in full, giving details of past experience to, or, if local, call on:—

Personnel Officer,
THE DE HAVILLAND ENGINE COMPANY LIMITED,
Stag Lane, Edgware, Middx.

7496

SOUTH WALES ELECTRICITY BOARD

FIRST ASSISTANT DISTRICT ENGINEER required, District 463/464 (Abergavenny) in the Eastern Sub-Area of the Board.

Salary Class D, Grade 4 (£930/£995) of the N.J.B. Schedule.

Applications stating age, present position and salary, qualifications, experience, and three referees, should be addressed to the Secretary (Establishments Section), St. Mellons, Cardiff, so as to reach him not later than Monday, 14th October, 1957. 646

***Situations Vacant** (continued)*

ENGINEERS
required by the
ATOMIC ENERGY RESEARCH ESTABLISHMENT, HARWELL,
to be responsible to the Engineer-in-Charge for the operation (on a shift basis) of complex electro-mechanical plant connected with a novel neutron project.

Corporate membership of a senior engineering institution (or equivalent) required. Experience in E/M plant operation in power, steel, chemical engineering or industrial electronics desirable.

Salary £815-£1,270 (Engineer III).

Housing, superannuation and other excellent conditions.

Send POSTCARD for application form and details to Recruitment (902Y/48), A.E.R.E., Harwell, Didcot, Berks. 575

THE WAR OFFICE
has vacancies in Cyprus for ARCHITECTURAL and CIVIL ENGINEERING ASSISTANTS and in Gibraltar for MECHANICAL and ELECTRICAL ENGINEERING DRAUGHTSMEN.

Candidates should have obtained O.N.C. or equiv. qual. in subjects appropriate to those vacancies, have completed normal apprenticeship, or have had equivalent training for not less than three years, and at least one year's experience in drawing office.

Salary £550 to £870 per annum, starting according to age, qual. and exp., plus foreign service allowance.

Applications should be made to any Employment Exchange, quoting reference No. O.M.P. 2385/56. Sheet No. 136. 626

CENTRAL ELECTRICITY AUTHORITY
North West, Merseyside and North Wales Division

SHIFT CHARGE ENGINEER required for Bolton Power Station. Salary £935/£995 (G.7) plus 10% shift allowance. Superannuable. Candidates should preferably possess H.N.C. in Electrical and/or Mechanical Engineering and have had sound power station experience.

Application forms may be obtained from the Director of Labour and Welfare, Central Electricity House, 825, Wilmslow Road, Manchester, 20, and returned not later than 5th October, 1957. Please quote Vacancy No. E.6/391/R. 624

A TECHNICAL sales representative for London and Home Counties. Generous salary / commission / expenses / superannuation. Right man can earn over £1,000 p.a. Must own car. 5-day week. Only applicants with experience, initiative and dynamic personality will be considered. Full details to Man. Dir., British Central Electrical Co. Ltd., 6, Rosebery Avenue, London, E.C.1. 585

AN electrical engineer is required for a junior post in a department concerned with design and development of a wide range of electro-mechanical and electro-pneumatic equipment, and compressor and similar motors for railway braking systems. Applicants should have reached S2 or S3 level in electrical engineering, and should preferably have had practical experience in developing or testing D.C. motors. Day release may be granted in special cases to permit technical studies to be continued. Five-day week and superannuation fund. Write in confidence giving age, qualifications and experience to Personnel Superintendent, Westinghouse Brake & Signal Co. Ltd., Chippenham, Wilts, quoting reference No. Equip/N/A3. 631

ARMATURE winder wanted, used to repair shop work, A.C. and D.C. Steady job for right man. Good pay and prospects. South London district.—Box 632.

ASSISTANT manager required for expanding transformer department. Must be capable of designing most types of transformers up to 250 kVA. Good prospects for the right man. Annual bonus scheme.—Austin Walters & Son Ltd., Ayres Road, Old Trafford, Manchester, 16. 586

ASSISTANT technical manager required by company engaged in the manufacture of rubber and thermoplastic cables. Applicants should preferably be graduates in electrical engineering or physics or hold equivalent qualifications, and should have previous experience in the electrical cable industry. Applications, giving age, qualifications, experience and salary required, to be addressed to—Personnel Officer, St. Helens Cable & Rubber Co. Ltd., Liverpool Road, Trading Estate, Slough, Bucks. 655

ASSISTANT electrical engineer. The Morgan Crucible Company Limited invites applications from candidates in the 28/35 age group, who hold a minimum qualification of O.N.C. in Electrical Engineering. The successful candidate will be appointed to the central engineering department and should have had experience in the preparation of lighting and power schemes for factory and office premises, be able to prepare electrical drawings and develop intricate circuits for the automatic operation of plant, and be familiar with lift controls and electric motors. He should be fully conversant with I.E.E. Regulations and B.S. Specifications. His duties will involve the preparation of estimates and schemes, the drafting of specifications and the supervision of contractors. Appointment will be to the permanent superannuated staff. Benefits include a non-contributory life insurance, staff canteen and full social and sporting amenities. Please make written application, in strict confidence, to the Staff Department, Battersea Church Rd., London, S.W.11, and quote ref. "Wes." 633

BERKSHIRE COUNTY COUNCIL. Assistant engineer (electrical), Grade A.P.T. III (£845-£1,025). Applicants should have had considerable experience in all branches of electrical work and should be capable of designing schemes and preparing contract drawings and specifications for installations in schools and other large public buildings. Application forms and further particulars can be obtained from J. T. Castle, A.R.I.B.A., A.M.T.P.I., County Architect, Wilton House, Parkside Rd., Reading, to whom they should be returned not later than Thursday, 17th October, 1957. 587

CANADIAN electrical company requires estimating and contract engineer for transformer and switchgear department. Location Montreal. Applications addressed to Box 656 will be forwarded to Canada.

CIRCUIT diagram draughtsman required, preferably experienced in preparing automatic control gear schemes for interesting work with motorised pipeline valves. Applicants to have O.N.C. Electrical. Excellent opportunities for right applicant. Written applications stating experience, etc., to — Rotork Engineering Co. Ltd., Station Rd., Kingswood, Bristol. 9131

CONTRACTORS, progressive, in central London require senior designer draughtsman and also junior for electrical installations of all descriptions. Excellent prospects. Write experience and salary required.—Box 657.

CROMPTON PARKINSON Limited require a chief technical engineer at their Derby cable works. Applicants should be Corporate Members of the I.E.E. or equivalent, and should possess an intimate knowledge of the design and manufacture of paper, rubber and thermoplastic insulated cables up to and including 33 kV. The position offers exceptional scope to the right man and provides excellent working conditions with superannuation fund facilities. Applicants should provide full details of past experience and qualifications, together with salary expected. Applications should be addressed to the Director and General Manager, Derby Cables Ltd., Alfreton Road, Derby. 595

CROMPTON PARKINSON Limited require sales engineers for the indoor sales staff at their Chelmsford works. Applicants must have had a sound technical training and previous experience in handling enquiries relating to A.C. and D.C. rotating plant and control gear up to 1,500 h.p./kW. Superannuation scheme. 5-day week. Canteen, social and welfare facilities. Apply stating age, whether married or single and giving full details of previous experience and training to the Personnel Officer, Crompton Parkinson Limited, Chelmsford, Essex. 570

DESIGN and development engineers, aged 25-35, required by well-known company in S.E. London now expanding its development for quantity production of electro mechanical mechanisms. Applicants should possess H.N.C. or similar qualifications. Replies to Personnel Manager.—Box 659.

DESIGNER draughtsman. The vacancy is for a senior designer directly responsible to chief engineer. Experience in design of small electro mechanical devices essential. Qualifications necessary: H.N.C. or equivalent. The company is well established in S.E. London and is now expanding its facilities for mass production. Replies to Personnel Manager.—Box 660.

DRAUGHTSMAN required by electrical contractor in Ipswich for preparation of cable layouts. Previous experience in Air Ministry procedure an advantage.—Box 511.

EAST African installation contractors require supervising engineer, preferably experience abroad, aged 30/35, for general work.—Box 588.

ELECTRICAL contractors require experienced estimator - supervisor, preferably O.N.C. or H.N.C. Age 25-35. Write in confidence stating age, experience and salary required to—James Scott & Co. (Electrical Engineers) Ltd., 20, Grosvenor Place, London, S.W.1. 9130

ELECTRICAL control operators required for shift work in modern industrial generating station. Applicants must have power house experience including load control and the necessary switching operations, and preferably also in parallel working with the National Grid system. Most attractive rates of pay and conditions of service. Applications in writing giving age, qualifications and experience to the Labour Manager, The Clayton Aniline Company Ltd., Clayton, Manchester, 11. 634

ELECTRICAL distributors, old-established company near Liverpool Street (London) require young man with knowledge of electrical trade. As a result of expansion there are vacancies at head office, West End and Hammersmith branches for warehousemen, storekeepers, trade counter salesmen and clerks. All applications answered.—Box 661.

ELECTRICAL draughtsman. National Certificate standard or equivalent in electrical engineering. Experienced in electrical switchgear and distribution diagrams, automatic contactor switchgear for motor control. Previous paper mill experience preferred. Apply in writing giving details of age, training and experience to—Bowaters United Kingdom Pulp and Paper Mills Limited, Thames Division, Northfleet, Kent. 597

ELECTRICAL draughtsman, senior, required by engineering consultants to work initially in Dagenham area. Must be experienced in industrial applications. H.N.C. or equivalent. Salary £780-£900, plus expenses.—The Coniston Company, Eagle House, High Street, Wimbledon, London, S.W.19 (Tele. Wim. 8521). 662

ELECTRICAL draughtsman with experience of large transformer tank design and detailing up to 10,000 kVA required by consultants in London, S.W.1. Good mechanical draughtsmen who wish to specialise in this work will be given training in this expanding business with a stable future. Excellent salaries paid to experienced men with A.E.S.D. rate as minimum. Seniors and juniors are asked to apply to—Box 7414.

ELECTRICAL engineer required for London firm of consulting engineers. Previous experience in the design and specification of installations in schools, hospitals, etc., desirable but not essential. Write stating age, salary required and brief details of qualifications and experience to—Box 512.

ELECTRICAL engineer with sound training in control gear and good connections amongst users required as senior sales assistant to general manager. Must be prepared travel extensively in U.K. Good prospects for ambitious man.—Box 618.

ELECTRICAL mechanic required to take over maintenance of cardboard box making and printing factory in Central London area. Knowledge of lifts, Bobst machines and automatic control apparatus essential. Write stating age and experience to—Box 596.

ELECTRICIANS required for day and shift work on maintenance of paper mill plant. Good rates of pay and proficiency bonus. Sick benefit and contributory pension schemes. Canteen and sports facilities.—Bowaters United Kingdom Pulp and Paper Mills Ltd., Thames Division, Northfleet, Kent. 598

ELECTRONIC test engineer, H.N.C. standard, with electrical and mechanical experience, to deal with modification, testing and outside servicing. Salary commensurate with qualifications and experience. A pension scheme is in operation and the company has its own sports ground. Applications in writing giving full particulars to—Personnel Manager, Muirhead & Co. Ltd., Beckenham, Kent. 599

EXPERIENCED meter and induction instrument designers required by Chamberlain & Hookham Ltd., Birmingham, 5. Applications giving all details of electrical and mechanical design experience, age and technical status, will receive careful consideration. An appropriate offer will be made to suitable candidates. 9122

FOREMAN required for group of flare, stem and mounting mills for G.L.S. lamps. Must be experienced in mounting mill adjustment. Good salary and prospects for suitable man for whom a house can be made available. Pension scheme. Write — Manager, British Luma, Hardgate Road, Glasgow, S.W.1. 564

GENERAL clerk (male) required for office, with knowledge of the cable industry. No Saturdays. Please write or telephone—Armorduct Cable Co. Ltd., 256, Westminster Bridge Road, London, S.E.1 (WATerloo 6056). 636

HIGH voltage jointer required for work in South East England area. Applications are desired from jointers fully experienced with all types of plumbing and jointing on cables operating at voltages up to and including 11 kV. Conditions of service will be in accordance with the N.J.I.C. agreement.—C. Maurice Contractors Ltd., Lindsey Road, Bishop's Stortford, Herts. 663

IRAN. For twelve months only, experienced power house superintendent required to supervise operation of 1,800-kW power station. Remuneration and conditions first class. Only applications will full details will be considered. —Box 589.

JUNIOR order clerk, male, required by wholesalers, Hammersmith, London, district. Experienced in dealing with orders and telephone enquiries an advantage. Good wages and prospects. Reply giving all particulars which will be treated in the strictest confidence, to—Box 664.

MANCHESTER electrical contractors require an estimating engineer. Must be experienced in estimating accurately for major industrial and commercial contracts. After qualifying period suitable applicant will be invited to participate in the company's superannuation scheme. Full details to—Box 9132.

PAKISTAN. An electrical site foreman is required by the General Electric Co. Ltd., Magnet House, Kingsway, London, W.C.2, on a two-year contract in Pakistan. Practical experience of contracting work, including conduit wiring, overhead and underground distribution and erection of substation switchgear and equipment up to 11 kV is essential. Position is largely administrative and includes responsibility for engagement and control of labour, ordering of supplies, etc. Preference for a single man, bachelor accommodation being available free. Generous salary, kit allowance, leave, etc. Must be available to leave England within two months. Apply to the Staff Manager at the above address, stating age, experience and personal data. 600

PRODUCTION engineers, aged 28-40 years, salary range £800-£1,000 p.a., required for estimating, method development and tooling for batch and quantity production of small motors and similar electro mechanical devices. Qualifications necessary: H.N.C. or membership of recognised engineering institution. Replies to Personnel Manager.—Box 658.

REPRESENTATIVE for Lancs., Cheshire and N.W. England required by manufacturers of electrical accessories, preferably with established connection with architects, consultants, hospital boards, county councils, etc., and able to drive. Age, qualifications to—Wandsworth Electrical Manufacturing Co. Ltd., Albert Drive, Sheerwater, Woking. 567

SALES engineer required for Midland area by Birmingham firm of control gear makers. Age 25-35. Must have had works apprentice training and hold as a minimum O.N.C. (electrical). Car provided. Attractive salary and working conditions. Write stating age, experience and salary required to—Box 7362.

SERVICE engineer resident Glasgow required for large electrical group manufacturing rotating plant, rectifiers, electronics, switchgear. Prospects joining sales force for suitable applicant. Works training given. State in confidence particulars of training, experience and salary expected. Pension scheme available.—Box 637.

STORES and clerical assistants required. Knowledge of trade and equipment desirable. Good prospects. Pensionable.—London Electrical Co., 92, Blackfriars Road, London, S.E.1. 665

TECHNICAL assistant required to train for position of interest and responsibility in test section, dealing with the electrical testing of completed cable installations. Minimum qualifications O.N.C. electrical engineering or equivalent. Maximum age 25 years. Write stating age, experience and qualifications to—Contract Manager, W. T. Henley's Telegraph Works Co. Ltd., 59/62, High Holborn, London, W.C.1. 529

SIEMENS EDISON SWAN Ltd. (an A.E.I. company) invite applications for position of chief engineer of the power cable division. Applicants must have a good honours degree in electrical engineering and have had considerable experience in the design, development and production of high-voltage cables, including gas and oil-filled type. The position is one of full responsibility and offers opportunities for advancement to a man who can use his experience and abilities in the engineering functions essential to the stable and satisfactory production of existing and future types of supertension cables. We have in mind a starting salary of £2,000 p.a., but this would be dependent upon qualifications and experience. A liberal pension scheme is in operation and housing assistance can be offered in appropriate circumstances. Please send in first place particulars of age, qualifications, past experience and present employment to Director of Engineering, Siemens Edison Swan Ltd., Woolwich, London, S.E.18. All correspondence will be treated in the strictest confidence. 617

TECHNICAL assistant required by expanding electrical manufacturers in the Midlands to assist with estimates and contracts. Higher National Certificate or Graduate I.E.E. preferred but not essential. Excellent prospects and pension scheme. Write stating age, qualifications, experience and salary required to—Box 7424.

THE ARMORDUCT CABLE Co. Ltd., 256, Westminster Bridge Road, London, S.E.1 (Telephone, WATerloo 6056) requires the service of representatives with established connections with wholesalers in London and district. Please write or telephone to our Managing Director. 635

TRANSFORMER designer required, preferably experienced in high-voltage test and instrument transformer design. The vacancy offers considerable scope for a person with initiative and drive, interested in dealing with a large range of design problems. If required, help with housing could be arranged. Apply giving details of past experience, age and salary required to Personnel Officer, Foster Transformers Ltd., South Wimbledon, London, S.W.19. 7446

YOUNG electronic engineer required to work in design department of progressive company manufacturing electronic equipment, radio and television aerials. Laboratory experience desirable. Pension and life assurance scheme in operation. Apply stating age, experience, present appointment and salary to the Personnel Officer, Aerialite Ltd., Castle Works, Stalybridge, Cheshire. 544

APPOINTMENTS FILLED

Dissatisfaction having so often been expressed that unsuccessful applicants are left in ignorance of the fact that the position applied for has been filled, may we suggest that Advertisers notify us to that effect when they have arrived at a decision? We will then insert a notice free of charge under this heading.

SITUATIONS WANTED

ELECTRICAL engineer, C. and G. Certificate, requires post as representative, Leicester area, as additional line 20 hours week approx. Conversant with domestic, industrial, elect. lift engineering. Vehicle owner and phone installed.—Box 9115.

ESTIMATOR/supervisor (junior), some experience, age 27, to electrical contractors. —13, Conduit Road, Plumstead, London, S.E.18. 9133

GERMANY, Austria or Switzerland. Inspecting engineer, electrical, mechanical, wide experience, seeks permanent position. Speaks fluent German.—Box 9135.

MID-Glos. manager/supervising engineer (36), seeks employment. Experienced in preparing schemes, contract installations, power, lighting and heating.—Box 9129.

ARTICLES FOR SALE

200-kVA TRANSFORMER FOR SALE

ONE A.S.E.A., 200-kVA, 6.6-kV/440-volts, 3-phase, reconditioned transformer with tappings ± 2½%.

THE MIDLAND ELECTRIC INSTALLATION CO. LTD.,
Cyprus Works,
Upper Villiers Street,
Wolverhampton. 507

ELECTRICAL EQUIPMENT FOR SALE

1 L.D.C. 70-h.p., 220-volt D.C., shunt wound, 280/370-r.p.m., continuously rated, semi-enclosed Motor, complete with BROOKHIRST pillar type starter.

1 L.D.C. 260/56-h.p., 970/580-r.p.m., two-speed, Maxtorq semi-enclosed Motor for 400/440 volts, 3-phase, 50 cycles, complete with ALLEN WEST starter.

1 BRUSH 100-kW, 220-volt D.C., 600-r.p.m. compound interpole Generator, complete with spare armature.

The above for immediate sale.

Apply C. Townsend Hook & Co. Ltd., Papermakers, Snodland, Kent. 602

ELECTRIC HOUSE SERVICE METERS

PREPAYMENT and credit, 200/250 v. A.C., s/p., 50 c., 2½-100 A. Fixed or variable tariff. Reconditioned, fully tested and guaranteed 2 years. Prompt delivery, carriage paid.

ALBERICE METER COMPANY
Fairfax Works, Fairfax Rd., London, N.8
(Tel. MOUntview 7944, 6373) 191

ABABCOCK & Wilcox water tube boiler will cut down your fuel costs; we can supply from stock. Two 40,000 lb. evap., 220 lb. w.p.; one 25,000 lb. evap., 200 lb. w.p.; 3,000 lb. evap., 400 lb. w.p.; Spencer Bonecourt boiler; also Marine, Cornish vertical, etc.—Burford, Taylor & Co. Ltd., Boiler Specialists, Burtayco House, Church Street, Middlesbrough (Tel. Middlesbrough 2622). 122

A.C. and D.C. motors, generators, from stock.—Service Electric Co. Ltd., Honeypot Lane, Stanmore, Middx. (Edgware 5566/9). 91

A.C. and D.C. 1/- Slotmeters. Guaranteed 2 years, 2½-50 amps. From 50/-. Repairs and recalibrations. See Billiard: Tradex Meter Co., Surbiton (Tel. Elmbridge 4487). 169

ALTERNATORS from ½ to 675kVA in stock, single and three-phase, all voltages and frequencies. Guaranteed. Many unused. Send your requirements.—Fyfe, Wilson & Co. Ltd., Station Works, Bishop's Stortford. 162

ALTERNATORS, generators, 1-100 kVA, all voltages. Specialists—Powerco Ltd., 312, York Rd., London, S.W.18 (VAN. 5234). 147

ALTERNATORS, 3-phase, all sizes in stock from 7 kVA up to 330 kVA.—Britannia Manufacturing Co. Ltd., 20/26, Britannia Walk, London, N.1 (CLErkenwell 5512). 24

ALUMINIUM, brass and copper in sheets, rods, tubes, angles, etc. Sheared blanks a speciality. Approved stockholders. For immediate attention, phone or send your inquiries—R.D.C., 100 Hampstead Rd., London, N.W.1 (EUSton 5176/7). 352

BARGAINS in electric motors are always being obtained from A. Cooksley & Co. Ltd., 21/25, Tabernacle Street, London, E.C.2. Stocks include A.C. and D.C. motors, second-hand and new up to 30 h.p. Starters, slide rails and pulleys. Ring Mon. 3355 for your requirements. 50

BILLIARD Meters. 1/-, 6d. or 1d. slot. All time settings. From 140/-. See Quarterly.—Tradex, Surbiton. 170

CABLE, underground, all types ex stock.—E. M. Tatton Co. Ltd., Kew Bridge, Brentford (Ealing 3155/6). 117

CABLE, underground, PILC/VIR/LC, ex London stock. Cutting orders same day delivery London area. Send for priced stock lists.—Batt Electrical Co., 6, Dock Street, London, E.1 (Tel. ROYal 5905). 316

CIRCUIT breakers, various sizes in stock, A.C. and D.C., 200 amperes up to 2,000 amperes. Also dynamo and alternator switchboards.—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1. 26

COMPLETE modern high-class steam turbine plant, 5,000 kW capacity, 5,000/5,500 v., 3-phase, 50 cycles, 600 lb. p.s.i., 870 deg. F., with two boilers, 37,000/46,000 lb. per hour, 750 lb. p.s.i., with control and distribution equipment and two 3,500-kVA transformers. Low price for quick sale.—Box 638.

CONVERTERS, 110 and 220 v. D.C./230 v. A.C., .5 to 6 kVA; also A.C./D.C. Special voltages at short notice.—Powerco Ltd., 312, York Rd., London, S.W.18 (VAN. 5234). 150

CRANE motors. Direct current, series wound or compound wound, all voltages. We have large stocks.—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1. 22

Articles for Sale (continued)

DIESEL generating sets, all sizes to 500 kW. Britannia Mtg. Co. Ltd., Britannia Walk, London, N.1. 16

ELECTRIC cable for sale at half price : 198 reels (100 yards per reel) Callenders braided 2-core, size 70/.0076, A.I.D. approved, offered at 60s. per reel for whole consignment, ex warehouse.—King, 42a, Brewery St., Handsworth, Birmingham, 21. 666

ELECTRIC motors, dynamos, alternators and motor generator sets of all sizes. We hold one of the largest stocks in England. New and reconditioned, with 12 months' guarantee.—Britannia Manufacturing Co. Ltd., Britannia Walk, London, N.1 (Clerkenwell 5512, 3 lines); also Works and Stores, Chobham, Surrey. 20

ELECTRIC motors, generators, control gear, transformers, A.C. and D.C., new and reconditioned; all covered with our usual 12 months' guarantee; large stocks available.—Electropower Co. Ltd., Kingsbury Works, Kingsbury Road, London, N.W.9 (Colindale 4621-2). 42

ELECTRIC motors, generators, motor generator sets, transformers, switchgear, etc., large comprehensive stock, overhauled and guaranteed. Copy of our Register, "Electrical Surplus," containing thousands of items of electrical plant, sent on request.—R. F. Winder Ltd., Belgrave Electrical Works, Leeds, 2. 54

ELECTRICIANS. Send for details Shaftesbury lightweight "Bantam" ladders. Top sections fitted with patent moulded rubber blocks, eliminate possibility of scratching or marking walls, fascias, and other painted or highly polished surfaces. Also available for immediate delivery, steps, platform steps, trestles, telescopic trestles, pole and builders-type ladders, and all sizes of two and three-section extension ladders.—Shaftesbury Ladders Ltd. (E.R.), 453, Katherine Road, London, E.7 (Phone: Grangewood 3363/4). 111

FLUORESCENT tubes reconditioned and guaranteed as new for 7s. 6d. each. Free collection and delivery in Lancs and Yorks.—The Anglo-American Electrical Company, Bury New Road, Breightmet, Bolton, Lancs. (Telephone, Bolton 7251). 212

FRACTIONAL h.p. motors, new, ex stock, A.C./D.C., Universal, B.T.H., Delco-Remy, G.E.C., Fracmo, Newman, Scophony. — Jeary Electrical Co. Ltd., 5, Lamb's Buildings, London, E.C.1. 126

GENERATING plants, remote and M/F up to 10 kVA; also secondhand A.C. and D.C. sets up to 100 kVA, large stock all types. Special plants built at short notice.—Powerco Ltd., 312, York Road, London, S.W.18 (Tel. VAN. 5234). 151

GENERATING sets for sale, petrol, diesel and steam, from 1 kW up to 700 kW. A.C. and D.C. switchboards.—Fyfe, Wilson & Co. Ltd., Station works, Bishop's Stortford. 161

HOUSE service meters, C. & H., Aron, E.A.C., 20-240 v. A.C., s.-ph., 50 c., 2½ amps., 7s. 6d. each, 1s. 6d. postage; 5 amps., 17s. 6d. — Universal Electrical, 217-221, City Road, London, E.C.1. 37

MOTOR generator sets and converters, all sizes and voltages from ½ kW up to 500 kW in stock.—Britannia Manufacturing Co. Ltd., 22-26, Britannia Walk, City Road, London, N.1 (Tel. Clerkenwell 5512, 5513 & 5514). 12

MOTORS, starters, circuit-breakers. Huge stocks of all types, ¼ to 300 h.p. Stock list or quote by return.—J. S Ramsbottom & Co. Ltd., Electrical Engineers, Keighley (3774-5-6). 70

MULTI-winding machine in full working order, recently serviced by the Leesona Company's engineer. Must sell, space urgently required. Bargain £495. — Phone Kingston 4413. 667

NAMEPLATES, engraving, diesinking, stencils.—Stilwell & Sons Ltd., 153, Far Gosford Street, Coventry. 108

OFFERS wanted for 30 five-h.p. electric motors by E.C.C., 400 volts, 3-phase, 50 cycles, 1,435 r.p.m., practically new.—William Tatton & Co. Ltd., Mayfield Mills, Mayfield, Nr. Ashbourne, Derbyshire. 620

PHASE converters, single to three-phase. several sizes in stock up to 90 h.p., 3-phase loading. — Britannia Mfg. Co. Ltd., Britannia Walk, London, N.1. 29

PLATING dynamos and motor generator sets, various sizes from 500 amps. up to 2,000 amps., with A.C. or D.C. motors.—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1. 15

POLYPHASE kilowatt hour meters. Available from stock.—Universal Electrical, 221, City Road, London, E.C.1. 40

PREPAYMENT 1s. slot house service meters. —Universal Electrical, 217-221, City Road, London, E.C.1. 36

PURLEY chokes and ballasts. Our 80-w. tapped h.p.f. ballast with starter switchholder incorporated is proving itself the most popular unit. Suitable for most fittings. 57s. 6d. each subject. — F. W. Blanshard Ltd. (Dept. ER), Purley, Surrey (Uplands 4818/9). 52

QUARTERLY Credit Meters, single & poly-phase, 2½-100 amps. From 17/6d. Also D.C. See Television.—Tradex, Surbiton. 171

ROTARY converters in stock, all sizes: enquiries invited.—Universal Electrical, 221, City Road, London, E.C.1. 34

SMALL BA screws and nuts in steel, brass and stainless steel, from stock.—Premier Screws & Repetition Co. Ltd., Woodgate, Leicester. 180

STEAM-driven pass-out turbine-alternator for sale. Made by W. H. Allen, Sons & Co., Bedford. 350 kW, 400 v., 3 ph., 50 cyc., 180 lb. super heated steam pressure, 25 lb. process steam, 700-amp. panel, voltage regulator. Surface condenser cooling water pipes, pump and sprays. Can be seen by appointment.—George Lee & Sons Ltd., Providence Mills, Westgate, Wakefield. 530

SURPLUS motors (new and unused). Large stocks to be sold at fraction of cost. 1, 2, 3 and 5 h.p., A.C. and D.C., three-phase, 37 types. Write for lists.—Spares Dept., Steels Engineering Products Ltd., Sunderland. 603

TELEVISION slotmeters & Time Switches. Details from: Tradex Meter Co., Surbiton. Elmbridge 4487. 172

TIME switches from stock. Reconditioned or new. 12 months' guarantee. Lists from—J. W. Hughes, 3, St. Thomas Street, London Bridge, London, S.E.1 (Tel. HOP 2759). 178

VENNER time switches, 200-240 v. A.C./D.C., 10-50 amps., from stock.—Universal Electrical Co., 221, City Rd., London, E.C.1. 38

WARD Leonard motor generator sets, all sizes.—Britannia Manufacturing Co. Ltd., 22-26, Britannia Walk, London, N.1 (Tel. Clerkenwell 5512). 10

½" B.C. lampholders without s.c. rings, un-tarnishable metal suitable fittings. Very competitive.—N.L.C., 40, Manchester Street, London, W.1 (WEL. 3300). 621

1 B.T.H. refrigerator for 110 v. D.C. or A.C., inside measurement 22" × 16" × 32".—V. D. V. Suddicom, Penbedw, Nannerch, Mold. 669

2 Lister automatic diesel sets, viz., 1 110-v., 10-kW output; 1 110-v., 3½-kW output. Suitable for country house installation or emergency lighting system. Both in perfect running order and serviced by Listers.—V. D. V. Suddicom, Penbedw, Nannerch, Mold. 668

400-cycle to 1,500-cycle motor alternators and alternators.—Britannia Mfg. Co. Ltd.. Britannia Walk, London, N.1. 27

500 weatherproof 200-w. floodlights, £2 each; 300 ditto, 1,000 w., Simplex, £7 each.—Box 574.

885 new storage cells for sale, heavy duty. 570 amps., ebonite container and sealed covers. Orig. made for Admiralty, packed 4 per wood case for transit. Low price for quantities. — Burleigh Alpine Works, Empire Way, Wembley (Tel. 0211). 324

EQUIPMENT FOR HIRE

GENERATING set hire service. Consult the most experienced firm for A.C. and D.C. units from 2 kW to 240 kW diesel or petrol. stationary or mobile, sale or hire. 24-hr. breakdown service. — Dawson-Keith Ltd., Hillview Rd., Sutton, Surrey (Fairlands 4401). 46

RELIABLE, self-contained diesel electric generating sets for hire, 2.5 to 260 kW. Night and day maintenance service. Quotations by return. — Whitetrade Limited, Rochester. Kent (Tel. Chatham 4638/9). 294

CLASSIFIED ADVERTISEMENTS

ARE PREPAID

SALES BY AUCTION

At 17, Maze Pond,
St. Thomas Street, London, S.E.1
(Nr. London Bridge Station)
on
THURSDAY next, 3rd OCTOBER,
at 11 o'clock

ELECTRICAL INSTALLATION CONTRACTORS' STOCK

comprising 8,000 Switches, Switchplugs, Sockets, 5, 13 and 15 amps., by M.K., Crabtree, Tucker, Wandsworth, etc.; Brass Lampholders, Push Bar ditto; Ironclad Switch and Fusegear to 600 amps.; large quantities Conduit Fittings; G.E.C. and Hotpoint Immersion Heaters, and large variety wiring accessories by leading makers.

On view day prior and day of Sale.

Catalogues of the Auctioneers :
CENTRAL MERCHANDISE MART
20, Sackville Street, London, W.1
Phones : HOP 0216 and REGent 7671.
Grams : Loudsigs, London."

601

ARTICLES WANTED

BRADLEY Redundant Electricals, 74, Eversleigh Rd., London, E.6 (Phone GRA. 2750). London leading clearing house for all redundant electrical stock and equipment, A.C. and D.C. motors, generating plants, welders and diesel sets. Complete factories bought and dismantled if required, also small or large stocks of scrap cable (dismantled if required). Estimates given. 185

COIL winding machine required for winding electric solenoids and field poles on generators.—Box 516.

HARRINGTON & Sons, reclamation contractors, want redundant A.C./D.C. electric motors and transformers, stocks of cable, etc. — 109, Beaconsfield Street, New Beckton, East Ham, London, E.6 (ALB. 1388). 315

NEWTON carbon pile regulators type 1698. —Box 515.

SURPLUS laminations, enamel copper wire, screws, nuts, flex. Good prices paid. Full details to—Box 199.

SURPLUS stocks of all types of domestic electric appliances wanted for prompt cash. Large funds available.—Spears, 14, Watling St., Shudehill, Manchester (Phone, Blackfriars 1916) (Bankers, Midland Bank Ltd.). 338

WANTED, D.C. and A.C. ball-bearing motors, motor generator sets, dynamos and alternators. Full details to—Britannia Manufacturing Co. Ltd., 22-26, Britannia Walk, London, N.1. 13

WANTED for prompt cash, ferrous and non-ferrous scrap, also plant for dismantling. Buyers of secondhand machinery and plant for re-use.—W. & H. Cooper Ltd., 176, Brady St., Bethnal Green, London, E.1. 120

WANTED, rotary converters, any sizes.—Universal, 221 City Rd., London E.C.1. 35

WANTED, surplus stock cable, all types and sizes. We can inspect.—Box 220.

WORK WANTED AND OFFERED

A.C. and D.C. motor rewinds and repairs. Prompt service, fully guaranteed.—Edgware 5566/9; Service Electric Co. Ltd., Honeypot Lane, Stanmore, Middx. 92

CONTROL gear manufacturers have spare labour and capacity for production of new developments.—Box 619.

ELECTRIC motor rewinds and repairs of all kinds, including portable tools. Quick deliveries. Many spares in stock. High-cycle motors a speciality. — Woodward Bros. Ltd., Victoria St., London, E.15 (Phone MAR. 2074). Est. over 70 years. 9134

ELECTRICAL and mechanical engineers have capacity for design and/or development and production of components or complete equipment. Advertisers, A.I.D. approved, are sub-contractors to many well-known firms, Ministry of Supply, Admiralty, etc. — Service Electric Co. Ltd., Stanmore, Middx. (Edgware 5566). 7344

SMALL armature, stator, transformer and general coil winding undertaken on production run.—Kensal Electrics Ltd., 151, Kensal Rd., London, W.10 (LAD. 4530). 202

BUSINESS OPPORTUNITIES

MANUFACTURERS of quality fluorescent fittings, tubes, starters and control gear wish to contact quantity buyers, wholesalers, agents, etc., interested in purchasing in quantity at special low prices. Advertisers are interested in long or short term arrangements.—Box 213.

EDUCATIONAL

THE POLYTECHNIC
309, Regent Street, London, W.1

A SPECIAL course of eight lectures on SURGES IN ELECTRICITY SUPPLY SYSTEMS will be given on Friday evenings, commencing 25th October next, at 7 p.m.

Enrolment forms and syllabus may be obtained on application to the Head of the Electrical Engineering Department. Fee £1 1s. 616

CITY & Guilds (Electrical, etc.) on "No Pass —No Fee" terms. Over 95% successes. For full details of modern courses in all branches of Electrical Technology send for our 144-page handbook. Free and post free.—B.I.E.T. (Dept. 12A), 29, Wright's Lane, London, W.8. 100

LEARN electrical engineering the practical way. Our new self-study course includes equipment on which experimental work can be carried out. Also courses for all professional examinations. Free brochure from E.M.I. Institutes, Dept. ER57, London, W.4 (Associated with H.M.V.). 318

BOOKS, INSTRUCTIONS, ETC.

"SHORT-WAVE Radio and the Ionosphere." By T. W. Bennington. This book shows how existing ionospheric data can be applied to everyday problems of short-wave transmission and reception. 2nd Edition. 10s. 6d. net from all booksellers. 11s. 2d. by post from Iliffe & Sons Ltd., Dorset House, Stamford St., London, S.E.1. C7

"ABACS or Nomograms," by A. Giet. Translated from the French by H. D. Phippen and J. W. Head. Most engineers have made use of nomograms at some time in their careers, and are fully alive to the fact that they are a very convenient tool when the same formula has to be solved repeatedly for several sets of variables. It is fair to say, however, that only a small proportion of even those who habitually employ nomograms know how to construct them for their own use. Most of the comparatively small literature on the subject is written for mathematicians and is extremely difficult for the practical engineer to comprehend. This book is essentially practical, and not only demonstrates the many and varied applications of the abac or nomogram, but shows how even those without highly specialised mathematical knowledge may construct their own charts. 35s. net. From all booksellers. By post 35s. 10d. From the publishers: Iliffe & Sons Ltd., Dorset House, Stamford Street, London, S.E.1. C14

LAPLACE TRANSFORMS FOR ELECTRICAL ENGINEERS

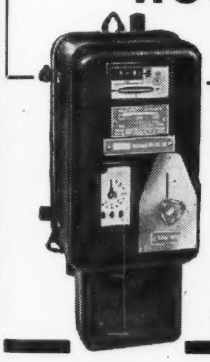
By B. J. Starkey, DIPL. ING., A.M.I.E.E.

A presentation of the theory of Laplace transformation in which a physical vocabulary rather than a purely mathematical one is used as far as possible. This method of analysis has become of increasing importance to electrical engineers in many fields, and the work is designed to provide a thorough treatment of the subject in a language with which they will be familiar. Published for "Wireless Engineer."

30s. net. BY POST 31s. 0d.

From booksellers or direct from Iliffe & Sons Limited, Dorset House, Stamford Street, London, S.E.1

HOUSE SERVICE METERS



Credit Pattern
and Prepayment Type
200-240 v. A.C. S/Ph 50 c. (& D.C.)
AVAILABLE FROM STOCK
POLYPHASE 400-440 v. 3-Wire Type
Ex Stock

UNIVERSAL ELECTRICAL CO.
217-221 City Road, London, E.C.1

'KENBAR'
ELSTREE
CONTROLS

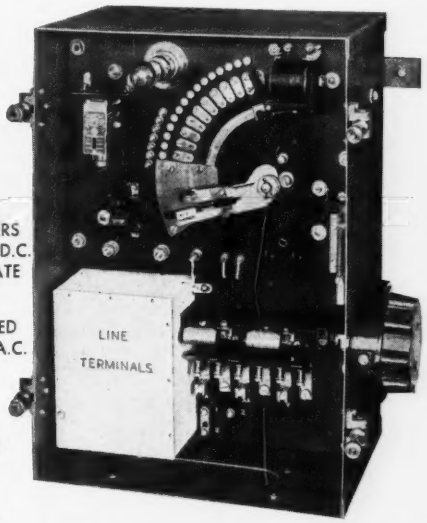
MOTOR STARTERS HAND OPERATED D.C. & A.C. FACEPLATE TYPE.

HAND OPERATED & AUTOMATIC A.C. STAR DELTA STARTERS.

PUSH BUTTON DIRECT ON LINE A.C. STARTERS.

COMBINED STATOR ROTOR STARTERS FOR A.C. SLIP RING MOTORS.

RESISTANCES.



MARINE TYPE D.C. CONTROLLER INCORPORATING COMBINED STARTER & SHUNT REGULATOR WITH SPEED LIMITING FEATURE, NO-VOLTAGE & OVERLOAD PROTECTION FITTED WITH INTERLOCKED DRUM TYPE ISOLATOR & REVERSING SWITCH.

KENBAR ELECTRICAL CO. LTD.
ESTABLISHED OVER 35 YEARS
FORSYTH ROAD - SHEERWATER - WOKING - SURREY
Phone: WOKING 5060 Grams: Amperage, Woking

DOMESTIC WATER HEATING

Basic Engineering Principles of Electric and Solid-fuel Installations.

THIS book, by Ronald Grierson, M.I.E.E., M.I.MECH.E., sets out the principles of domestic water heating and provides a critical analysis of current practice in the supply of hot water for domestic purposes.

The author applies sound engineering principles to the design of water heating plant of the solid-fuel/electric type, thereby increasing efficiency and decreasing running costs. He deals mainly with the combination of an electric immersion heater and thermostat with a conventional hot-water storage tank, in conjunction with a coal- or coke-fired domestic water heater, this being arranged either as a "back-boiler" or as an independent unit. A suitably arranged installation of this type does, he contends, dispose of the widespread notion that "electric water heating is convenient but expensive."

25s. net. *By post 25s. 11d.*

Obtainable from all booksellers or direct by post from: The Publishing Dept., Dorset House, Stamford St., London, S.E.1. Send for the list of titles available.

INDEX TO ADVERTISERS

Acru Electric Tool Mfg. Co. Ltd. ... 24
Aircraft Marine Products (Gt. Britain) Ltd. ... 45
Allspeeds Ltd. ... 2
Alton Battery Co. Ltd. ... 51
Appelbe, J. F., & Co. Ltd. ... 16
Arcolectric Switches Ltd. ... 12
Armstrong Siddeley Brockworth Ltd. ... 5
Arrow Electric Switches Ltd. ... 26
Associated Fire Alarms Ltd. ... 78
Atlas Lighting Ltd. ... 59
Avo Ltd. ... 1
Axon Motor Re-winding Co. Ltd. ... 70

Barber & Colman Ltd. ... 78
Belmos Co. Ltd. ... 17
Benjamin Electric Ltd. ... 9
Beresford, James, & Son Ltd. ... 74
Berry's Electric Magicoal Ltd. ... 66
Birch, H. A., & Co. Ltd. ... 60
Birmingham Mica Co. Ltd. ... 60
Birmingham Specialities Ltd. ... 93
Blickvac Engineering Ltd. ... 72
Brentford Transformers Ltd. ... 83
Bridge, David, & Co. Ltd. ... 93
British Insulated Callender's Cables Ltd. ... 47
British Klockner Switchgear Ltd. ... 6
Brook Motors Ltd. ... 92
Brookhirst Switchgear Ltd. ... 56
Brown, N. C., Ltd. ... 57
Brush Electrical Engineering Co. Ltd. ... 15
Buck & Hickman Ltd. ... 82
Bullers Ltd. ... 69

Cayson Electrics Ltd. ... 94
Central Electricity Authority ... 41
Channel Conduits Ltd. ... 66
City Electrical Co. ... 114
Consolidated Pneumatic Tool Co. Ltd. ... 3
Craig & Derricott Ltd. ... 60
Cressall Mfg. Co. Ltd. ... 28
Crompton Parkinson Ltd. ... Cover 1

Daly (Condensers) Ltd. ... 53
Dane Electrical Controls Ltd. ... 74
Davey, W. C., & Co. ... 63
Dennis, G. P., Ltd. ... 34
" Diamond H " Switches Ltd. ... 68
Dimplex Ltd. ... 16
Donovan Electrical Co. Ltd. ... 114
Drummond, John (Engineers) Ltd. ... 88
Duncan Low Ltd. ... 20

E.I. du Pont de Nemours & Co. (Inc.) ... 11
East London Mica Works ... 19
Electric Construction Co. Ltd. .. Cover 2
Electric Repairs (Nottm.) Ltd. ... 32
Electrical Remote Control Co. Ltd. 112
Electrix Ltd. ... 27
Electroway Heaters Ltd. ... 93
English Electric Co. Ltd. ... 79
Evershed & Vignoles Ltd. ... 57

Ferguson Pailin Ltd. ... 80
Ferranti Ltd. ... 77
Fractional H.P. Motors Ltd. ... 60
Fuller Electric Ltd. ... 81
Furse, W. J., & Co. Ltd. ... 28

General Electric Co. Ltd. Cover 4, 96 & 100

Hampton Works (Stampings) Ltd. 23
Henley, Burrowes & Co. Ltd. ... 28
Henley's, W. T., Telegraph Works Co. Ltd. ... 84 & 85
Higgs Motors Ltd. ... 33
Hilmor Ltd. ... 94
Hurseal Ltd. ... 48

Iliffe & Sons Ltd. ... 54
Imperial Chemical Industries Ltd. ... 49
Insuloid Mfg. Co. Ltd. ... 62
Ismay Lamps Ltd. ... 31

Jackson Electric Stove Co. Ltd. ... 89
Jeary Electrical Co. Ltd. ... 88
Jelson Electric Ltd. ... 113

Kenbar Electrical Co. Ltd. ... 111

Ladybird Appliances Ltd. ... 114
Lancashire Dynamo Nevelin Ltd. ... 13
Langley Alloys Ltd. ... 58
Legg (Industries) Ltd. ... 67
Litholite Insulators & St. Albans Mouldings Ltd. ... 88
Liverpool Electric Cable Co. Ltd. ... 61
Lodge Plugs Ltd. ... 70
Lyons, Claude, Ltd. ... 55

M.K. Electric Ltd. ... 64
Macintyre, James, & Co. Ltd. ... 63
Magnetic Controls Ltd. ... 87
Measurement Ltd. ... 10
Mek-Elek Engineering Ltd. ... 12
Mercury Switch Mfg. Co. Ltd. ... 24
Meritus (Barnet) Ltd. ... 32
Metropolitan-Vickers Electrical Co. Ltd. ... 18 & 52
Metway Electrical Industries Ltd. 54 & 57
Midland Dynamo Co. Ltd. ... 31
Midland Electric Mfg. Co. Ltd. ... 4
Mole, M., & Son Ltd. ... 27
Mono Pumps Ltd. ... 23
Morgan Crucible Co. Ltd. ... 30
Morris, John, Electrical Engineering Co. Ltd. ... 93

Neco Geared Motors Ltd. ... 98
Newman Industries Ltd. ... 95
Non-Ferrous Die Casting Co. Ltd... 42

Oddie, Bradbury & Cull Ltd. ... 70
Oliver Pell Control Ltd. 35, 36, 37, 38, 39 & 40

Parmiter Hope & Sugden Ltd. ... 99
Parsonage, W. F., & Co. Ltd. ... 20
Paxtons (Electrical) Ltd. ... 24
Philips Electrical Ltd. ... 48
Phillips Control (G.B.) Ltd. ... 60
Pinchin, Johnson & Co. ... 86
Presspahn Ltd. ... 24
Prichard, Hugh, & Co. (Nottm.) Ltd. ... 20
Pyrotenax Ltd. ... 50

Rawlplug Co. Ltd. ... 46
Reyrolle, A., & Co. Ltd. ... 29
Rotunda Ltd. ... 72
Rowlands Electrical Accessories Ltd. 23

Sanders, W., & Co. (Wednesbury) Ltd. ... 14
Sax, Julius, & Co. Ltd. ... 112
Scemco ... 54
Scholes, Geo. H., & Co. Ltd. ... Cover 3
Scott, Hugh J., & Co. (Belfast) Ltd. 21
Service Electric Co. Ltd. ... 114
Sew-Tric Ltd. ... 54
Siemens Edison Swan Ltd. ... 73 & 113
Sifam Electrical Instrument Co. Ltd. 28
Simmonds Bros. ... 54
Simmonds & Stokes (Niphan) Ltd. 16
Simplex Electric Co. Ltd. ... 43
Simplifix Couplings Ltd. ... 94
Souplex Ltd. ... 112
Spicers Ltd. ... 76
Standard Telephones & Cables Ltd. 22
Steels Engineering Products Ltd. ... 25
Sturdy Electric Co. Ltd. ... 74
Sturtevant Engineering Co. Ltd. ... 7

Telco Ltd. ... 24
Thermostatic Controls Co. ... 19
Transformer & Electrical Co. Ltd. 113
Tufnol Ltd. ... 71
Tuscan Engineering Co. Ltd. ... 91

Universal Electrical Co. ... 111
Utilities (London) Ltd. ... 82

Vactric Ltd. ... 90
Varilectric Ltd. ... 67
Vernier Mfg. Co. Ltd. ... 91
Vernons Industries Ltd. ... 87
Volex Electrical Products Ltd. ... 97
Vulcanised Fibre Ltd. ... 8

Wandleside Cable Works Ltd. ... 20
Washers Ltd. ... 20
Weekes, L. (Luton) Ltd. ... 32
Westinghouse Brake & Signal Co. Ltd. ... 75
Wiggin, Henry, & Co. Ltd. ... 44
Wilcox, Edward, & Co. Ltd. ... 68
Wootton & Co. Ltd. ... 31

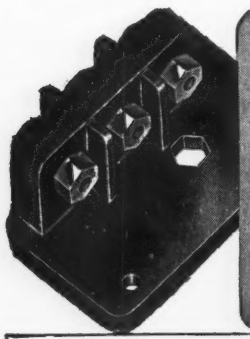
Zenith Electric Co. Ltd. ... 53

ADVERTISEMENT COPY AND BLOCKS

for printing in black and white should reach us 16 days preceding date of issue addressed to The Advertisement Department

ELECTRICAL REVIEW

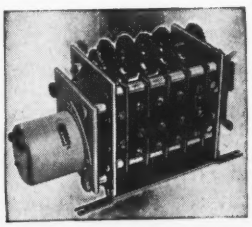
Dorset House, Stamford Street, LONDON, S.E.1



Quality PLASTIC MOULDINGS with Service

Consult SOUPLEX Limited

WESTGATE · MORECAMBE Phone 1717/8/9



Automatic Electrical Timing Equipment

Display Timers

Relays for AC and DC

Production Soldering Irons

ELECTRICAL REMOTE CONTROL CO. LTD.

HARLOW NEW TOWN, ESSEX

Telephone: Harlow 24032

SAX

Electrical Products

1. Ironclad Bells, Low and High Voltage, a.c. and d.c.
2. Luminous call systems relays, indicators, etc.
3. Bakelite Case Bells and Buzzers, Low and High Voltage, a.c. and d.c.
4. Underdome Type Bells for Ambulance, Factory and Fire Tenders.
5. Bell Transformers, Metal cased, 5-500 watt.
6. Multi-way Domed Glass Luminous Indicator.

Catalogue sent on request

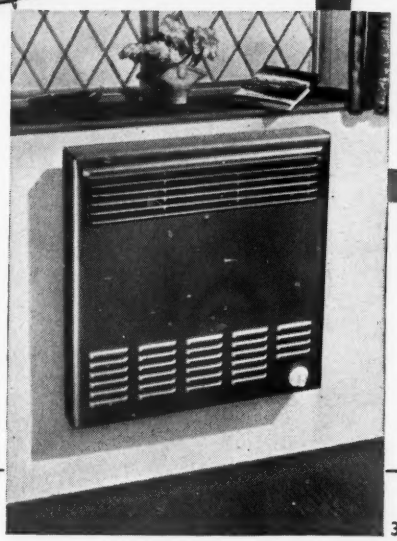
JULIUS SAX & CO. LTD. 24 COMMERCE ROAD BRENTFORD, MIDDX.

Telephone: EALing 6Q34-5

TUBULAR HEATERS
STANDARD & WATERPROOF
in sizes from 2ft. to 12ft.

SIEMENS EDISWAN

for quality of manufacture you cannot obtain better heaters at the price



'WAFER' CONVECTOR HEATERS

These robust popular wall mounted Heaters can be obtained from stock at any of our 25 Branches in 1 and 2 kw sizes.
500, 750 and 1500 watt are also manufactured.
With or without on/off Switch. Also with 3 Heat Switch.
Standard colour: Bronze.

Write for Leaflet DA.5 which also covers Wall Thermostats and the 3 kw Industrial Radiant Space Heater.

One of our Sales Engineers would be glad to call on you by arrangement.

SIEMENS EDISON SWAN LTD. *An A.E.I. Company*
38-39 Upper Thames Street, London, E.C.4. *25 Branches throughout the country.*

11243

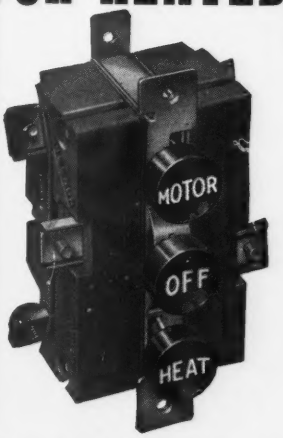
Insist on
T.E.C.

5 V.A.-100 K.V.A. TRANSFORMERS AND CHOKES

DISTRIBUTION TYPES
UP TO 100 K.V.A. 11 K.V.

Full Catalogue on request:—
The TRANSFORMER & ELECTRICAL CO. LTD.
HONYWOOD RD., BASILDON, ESSEX
Telephone: Basildon 20491/3

FOR HEATED WASHING MACHINES



Jelson
PRESS BUTTON SWITCHES ARE A

TECHNICAL ADVANCE WITH COMMERCIAL ADVANTAGE

Two AC only 15 amp 250 v D.P. Switches in one unit—ceramic insulation. Three varieties of operation—Independent, Interlocked sequence or Interlocked changeover. With or without manually reset Thermal trip for Heating Element and/or current overload trip for protecting Motor.

We shall be pleased to send full details.

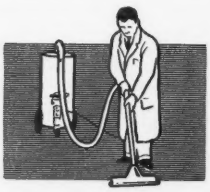
JELSON ELECTRIC LTD. PHONE: ACO. 0866
SPRING ROAD, TYSELEY, BIRMINGHAM 11

'Secomak' REG^{D} Model 51 Industrial Vacuum Cleaner

3 other models to choose from

Approved by Factory Inspectors

Wheels like a sack barrow but on pneumatic tyres.



Follows the operator when sweeping floors.

Clean and easy to empty.

POWERFUL — *Air volume 130 c.f.m. — over 50" water lift.*

MANOEUVRABLE — *Pneumatic tyres and swivel castors ensure easy manipulation in confined spaces.*

CAPACIOUS — *Dust capacity 1½ cubic feet.*

DEPENDABLE — *Powered by twin Secomak statair units.*

QUIET — *Power unit enclosed in sound proofed chamber.*

Write for data sheet 511/ER.

SERVICE ELECTRIC CO. LTD.

HONEYPOT LANE – STANMORE – MIDDLESEX *Tel.: EDGware 5566-9*

Manufacturing Electrical and Mechanical Engineers A.I.D. Approved.

Contractors to Admiralty and Ministry of Supply

at £14/19/0

thousands more of your customers can afford

THE 'Ladybird'

PERFECT FULL SIZED ELECTRIC FLOOR POLISHER

at £14/19/0

we give you the BIGGEST PROFIT PERCENTAGE of all

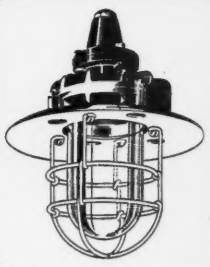
No other electric floor polisher opens up the market to thousands of housewives who otherwise could not hope to possess an electric floor polisher. *Remember* the 'Ladybird' is full-sized with full-sized brushes. *No maintenance*; only replacement of worn-out parts after years of trouble-free service. Easy and light to handle, easy to stow away. Stock NOW; price tells, price sells all-the-year round.

CHRISTMAS ADVERTISING. See 'Ladybird' price-compelling advertisements in Women's Magazines. Write for details and trade terms to:—

LADYBIRD APPLIANCES LTD., Dept. 6, Reliance Works, Oxford Rd., Wokingham, Berks. Tel.: Wokingham 238. Grams, Cables: AMILAWN, Wokingham

CONTACT DONOVAN FOR ALL ELECTRICAL WHOLESALE SUPPLIES

FLAMEPROOF FITTINGS



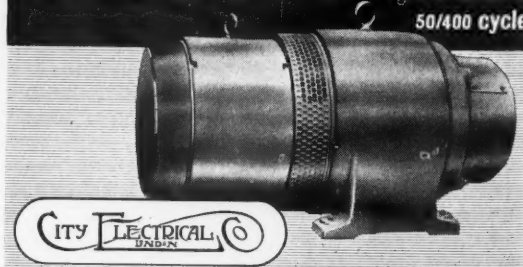
THE DONOVAN ELECTRICAL CO · LTD

WHOLESALING DIVISION

Granville St · Birmingham 1 · Tel: MIDland 5683 (5 lines)

FREQUENCY CHANGER

50/400 cycles



EMERALD STREET, LONDON, W.C.1. HOLBORN 9722

Published by ELECTRICAL REVIEW PUBLICATIONS LTD., at Dorset House, Stamford Street, London, S.E.1 and printed in Great Britain at THE CHAPEL RIVER PRESS, Andover, Hants.

57

el

er

o empty.

e easy

5566-9
of Supply

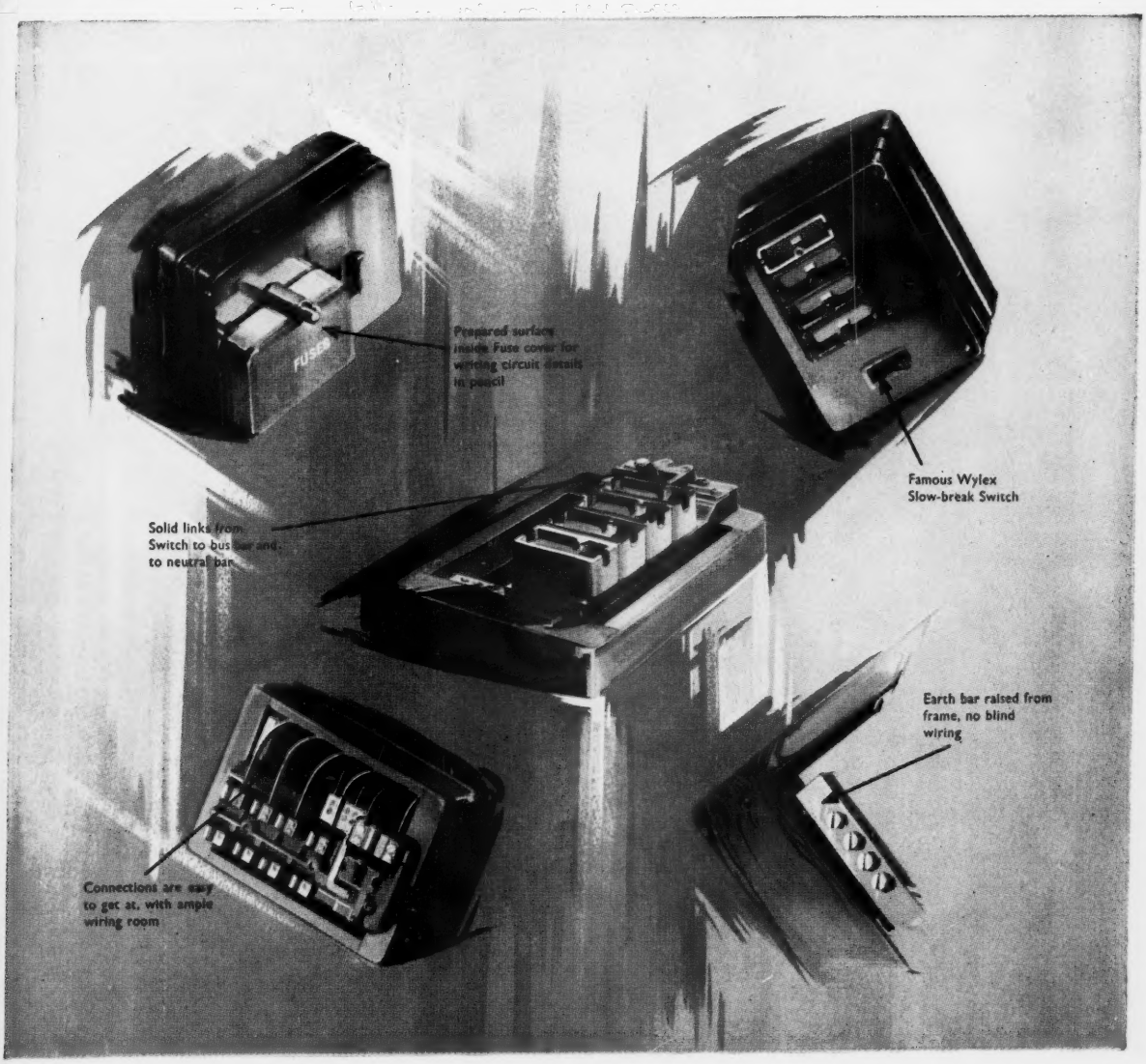
LTD

lines)

ER
cles

9722

Whichever way you look at it—


Prepared surface inside Fuse cover for writing circuit details in pencil
Famous Wylex Slow-break Switch
Solid links from Switch to bus bar and to neutral bar
Earth bar raised from frame, no blind wiring
Connections are easy to get at, with ample wiring room

the Wylex Switch Fuse Control Unit is a QUALITY JOB

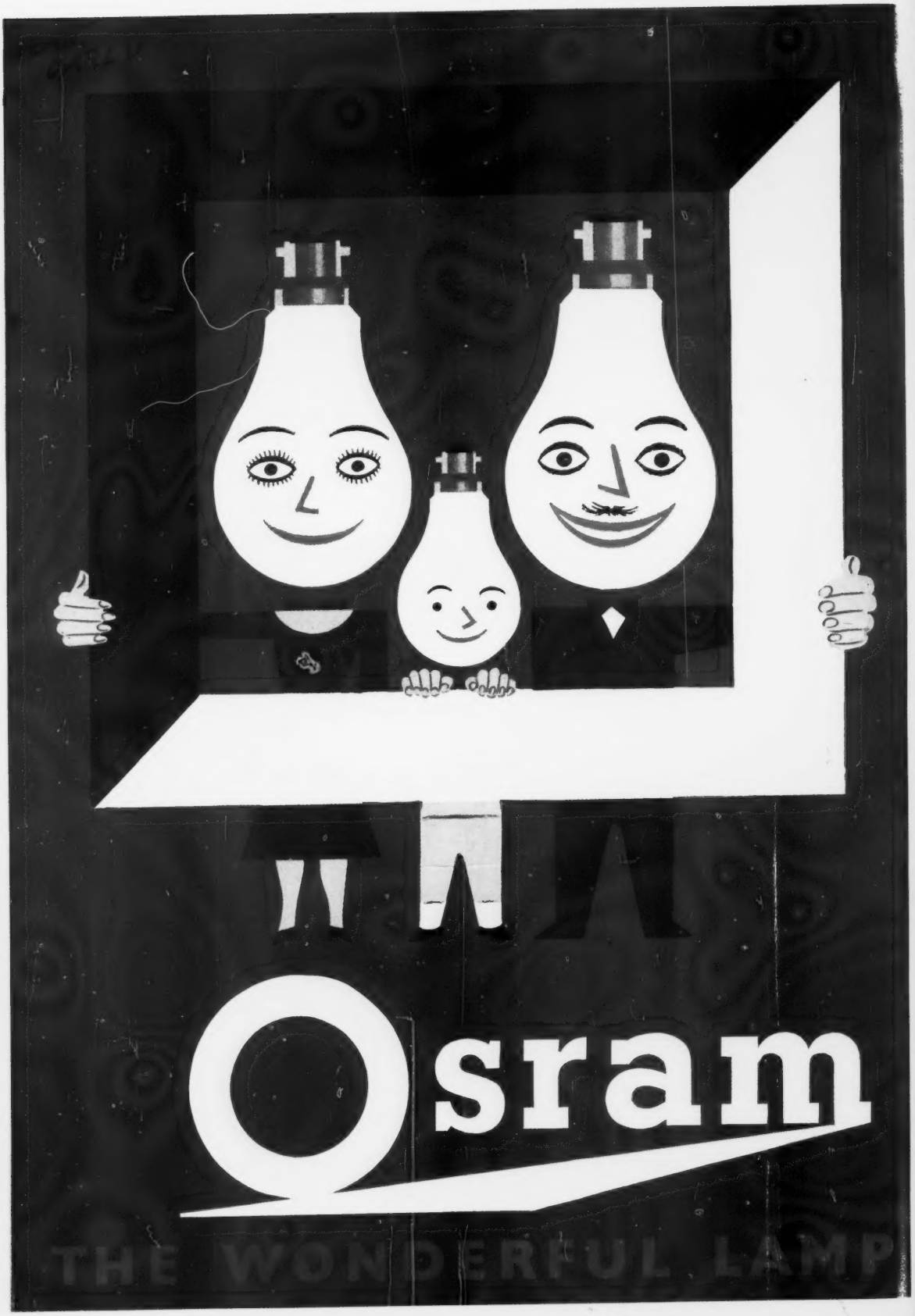
ALL-INSULATED
Brown or Cream
1, 2, 3, 4, 6, 8 WAYS
METALCLAD
Brown, 3, 4, 6, 8 WAYS

WYLEX

ANY COMBINATION OF 5, 15 OR 30 AMP. REWIRABLE OR H.R.C. CARTRIDGE FUSES

'Must be Good'

Write for Catalogue to :—
GEORGE H. SCHOLES & CO. LTD., WYLEX WORKS, WYTHENSHAWE, MANCHESTER 22


Osram
THE WONDERFUL LAMP